ROLE OF PULSE OXIMETRY AND PERFUSION INDEX IN SCREENING FOR CRITICAL CONGENITAL HEART DISEASE IN ASYMPTOMATIC NEWBORN BABIES

Dissertation Submitted to

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D.M. (NEONATOLOGY)

2009 – 2012

MADRAS MEDICAL COLLEGE

THE TAMIL NADU DR.M.G.R.MEDICAL UNIVERSITY

CHENNAI

ETHICAL COMMITTEE APPROVAL LETTER

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI -3

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CERTIFICATE OF APPROVAL

To
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Dear Dr. S. Ramesh

The Institutional Ethics Committee of Madras Medical College reviewed and discussed your application for approval of the proposal entitled "Role of pulse oximetry and perfusion index in screening for critical congential heart disease in asymptomatic newborn babies " No. 21102011.

The following members of Ethics Committee were present in the meeting held on 20.10.2011 conducted at Madras Medical College, Chennai -3.

1. Prof. S.K. Rajan, MD -- Chairperson
2. Prof. A. Sundaram, MD -- Member Secretary
   Vice Principal , Madras Medical College, Chennai -3
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7. Tmt. Arnold Soulina MA -- Social Scientist
8. Prof. Shanta Ravishankar -- Member
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We approve the proposal to be conducted in its presented form

Sd / . Chairman & Other Members

The Institutional Ethics Committee expects to be informed about the progress of the study, any SAE occurring in the course of the study, any changes in the protocol and patient information / informed consent and asks to be provided a copy of the final report

Member Secretary, Ethics Committee

CERTIFICATE

This is to certify that the dissertation entitled **"Role of pulse oximetry and perfusion index in screening for critical congenital heart disease in asymptomatic newborn babies"** is a bonafide work done by **Dr. S.RAMESH** during the period between October 2011 – January 2012 towards the partial fulfillment of requirement for the award of D.M. (NEONATOLOGY) degree examination to be held in August 2012 by The Tamilnadu Dr.M.G.R. Medical University, Chennai.

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DECLARATION

I solemnly declare that the dissertation entitled **“Role of pulse oximetry and perfusion index in screening for critical congenital heart disease in asymptomatic newborn babies”** is the original work done by me at the Institute of Child Health and Hospital for Children, Egmore, Chennai during the D.M. course (2009-2012), under the guidance and supervision of Prof.Dr.J.Kumutha, Professor and H.O.D. of Neonatology and Prof.Dr.S.Gnanasambandam, Professor and H.O.D. of Pediatric Cardiology. The dissertation is submitted to **THE TAMILNADU Dr.M.G.R. MEDICAL UNIVERSITY** towards the partial fulfillment of requirement for the award of **D.M. (Neonatology).**

Place: Chennai. (Dr.S.RAMESH)

Date: 13/3/2012

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CONTENTS

INTRODUCTION

Congenital heart disease (CHD) is the commonest group of congenital malformations and affects 7–8/1000 newborns. It contributes to 3% of all infant mortality and 46% of deaths from congenital malformations, with most deaths occurring in the first year of life. One of the major contributors to increased infant mortality and morbidity is clinical deterioration and collapse prior to diagnosis and treatment. Early detection of CHD in the asymptomatic period immediately after birth will reduce clinical deterioration by instigation of appropriate, timely management. Currently infants are screened to detect congenital heart disease by physical examination after birth and another examination at six to eight weeks. However, this method of screening fails to detect up to 50% of CHDs at birth.[1] Several studies have reported the use of pulse oximetry as a screening tool for the detection of CHD. However the detection of left sided obstructive heart diseases remains a problem area with pulse oximetry screening alone. Pulse oximeter sometimes does not detect left heart obstructive lesions which represented 75% of the false negative cases in study by Reide et al.[2] With this background, we planned a study to find out the utility of newer generation pulse oximeters with perfusion index in screening for congenital heart diseases.

REVIEW OF LITERATURE

Congenital Heart Disease And Critical Congenital Heart Diseases

Congenital heart disease, in a definition proposed by Mitchell et al., is "a gross structural abnormality of the heart or intrathoracic great vessels that is actually or potentially of functional significance." This definition excludes functionless abnormalities of the great veins, such as persistent left superior cava (even though this might be important during surgery), or of the branches of the aortic arch such as a combined brachiocephalic-left carotid arterial trunk. It usually excludes congenital arrhythmias such as the long QT and the Wolf-Parkinson-White syndromes, even if the disorders are based on abnormalities present at birth. Lesions such as hypertrophic or dilated cardiomyopathy are usually not regarded as CHD. Even though the abnormal genes that cause these disorders are present at birth, the cardiomyopathy is rarely detected at this time but usually presents later in childhood or adolescence.[3]

Pediatric cardiologists commonly define critical congenital heart defects (CCHD) as those that are either ductal dependent or require surgical or interventional attention in the first month of life.[4] In contrast, the AAP/ AHA statement used a broader definition, which included all lesions that would require surgery or catheter intervention in the first year of life.[5]

CHD may be classified into three different categories based on severity.

I. Severe CHD (Life-threatening CHD) : This category includes the majority of the patients who present as severely ill in the newborn period or early infancy. Some of these patients who die very early might not be included in studies that do not track every infant born.

A. All those with cyanotic heart disease

1. d-transposition of the great arteries

2. Tetralogy of Fallot, including pulmonary atresia and absent pulmonary valve

3. Hypoplastic right heart

    a. Tricuspid atresia

    b. Pulmonary atresia with an intact ventricular septum

    c. Ebstein anomaly

4. Hypoplastic left heart

    a. Aortic atresia

    b. Mitral atresia

5. Single Ventricle

6. Double Outlet Right Ventricle (DORV)

7. Truncus arteriosus

8. Total anomalous pulmonary venous connection (TAPVC)

9. Critical Pulmonary Stenosis (PS)

10. Miscellaneous uncommon lesions like double outlet left ventricle, certain unusual malpositions and some forms of l-transposition of the great arteries.

B. Acyanotic lesions

1. Atrio Ventricular Septal Defect (AVSD)

2. Large Ventricular Septal Defect (VSD)

3. Large Patent Ductus Arteriosus (PDA)

4. Critical or severe Aortic Stenosis (AS)

5. Severe PS

6. Critical Coarctation of Aorta

II. Moderate CHD (Clinically significant CHD): These require expert care, but less intensive than those listed above. Most of these are expected to be detected in a clinical study. They include:

A. Mild or moderate AS or aortic incompetence

B. Moderate PS or incompetence

C. Noncritical Coarctation of Aorta

D. Large Atrial Septal Defect (ASD)

E. Complex forms of VSD

III. Mild CHD (Clinically non-significant CHD): This is the most numerous group. Because these patients are asymptomatic, may not have significant murmurs and often undergo early spontaneous resolution of their lesions, inclusion of more or fewer of this group greatly influences the resulting observed incidence of CHD.

A. Small VSD

B. Small PDA

C. Mild PS

D. Bicuspid Aortic Valve without AS or aortic incompetence; these may move to moderate or severe categories if they deteriorate with age

E. Small or spontaneously closed ASD It is probable that most of the patients in the severe and moderate groups will be detected in any good medical system, and that the lesions that are the major causes of variability appear in the mild group.[3, 6]

If we consider which groups of patients with CHD use health care services, there will be obvious differences between the serious lesions like Tetralogy of Fallot and AVSDs and those such as small VSDs. The same distinction by category also applies to studies of incidence, in as much as it is the least severe lesions that account for most of the differences between various studies. Many studies have documented that the increase in the incidence of CHD with time was due solely to the increase in the incidence of mild forms of heart disease, which are now days diagnosed more often with the widespread use of echocardiography with colour flow doppler.[3]

There are two types of the ductus dependent cardiac lesions.

1) Ductus dependent systemic circulation (also called, **left sided obstructed lesions**) which includes hypoplastic left heart syndrome (HLHS), critical aortic stenosis (AS), "shone” complex variants, coarctation of the aorta (COA) and interrupted aortic arch (IAA). These require ductal patency to maintain perfusion to the whole or even just the lower sides of the body, or the child develops progressive acidosis as the duct constricts. Consequently, perfusion falls and leg pulses become weak, impalpable and oliguria develop due to renal impairment and become progressively compromised.

2) Ductus dependent pulmonary circulation (also called, **right sided obstructed lesions**) which includes TOF with pulmonary atresia (PA), pulmonary atresia (PA), pulmonary atresia with intact ventricular septum (PA /IVS), critical pulmonary stenosis (PS), tricuspid atresia, with PS/PA (with/without VSD), univentricular heart with PA /PS, severe Ebsteins anomaly and complete transposition of the great arteries with intact ventricular septum (TGA/ IVS). TGA with intact ventricular septum (TGA/IVS) serve as ductus dependent lesion, but large ASD is more important to mixing of the circulation. Most of these CHDs present progressive cyanosis without response in proper oxygen supply. Because their fetal physiology is chronically adapted to the hypoxia in the uterine life, newborn infants are able to tolerate some degree of cyanosis than older infants or children. The variety of CHD is immense, because of lots of combinations of defects, which can affect the various cardiac levels, atrium, ventricle, septum, veins or great arteries.

Category of cyanotic CHD can be divided into decreased pulmonary flow with right to left shunting lesions (PA, TA with shunting at the atrial or ventricular level); poor mixing lesions (transposition physiology); and right to left shunt with intra cardiac mixing lesions (TAPVC, single ventriclular physiology, truncus arteriosus).

Some CHD evolves during the fetal life as growth of cardiac structures is flow dependent. Thus, fetuses with mild left sided obstructive lesions may progress into coarctation/HLHS over time; similarly, pulmonary atresia with intact ventricular septum is considered a late phenomenon starting off as severe pulmonary stenosis. Persistent pulmonary hypertension of the newborn (PPHN) is another serious condition that is associated with other neonatal high risk factors which may be difficult to differentiate from the above mentioned cyanotic heart disease. Other differential diagnosis include inborn error of metabolism, neonatal sepsis, and other pulmonary conditions.[6]

Disease Burden- Morbidity & Mortality

Most CHD prevalence estimates are based on data from population-based birth defects surveillance systems; a review by Hoffman and Kaplan reported the inter-quartile range of prevalence estimates across 44 international studies for the common forms of CHD. For all types of CHD combined, the inter-quartile range was 60 to 105 CHD per 10 000 births. Routine utilization of echocardiography has significantly enhanced the ability to diagnose CHD, including minor abnormalities in asymptomatic infants. Hoffman and Kaplan concluded that much of the observed variability across the 44 studies reflected differences in ascertainment of minor CHD.[7]

Congenital heart disease affects about 7 to 9 of every 1000 live births in the United States and Europe (Botto, Correa, & Erickson, 2001; Knowles et al., 2005; Wren, Richmond, & Donaldson, 2000). About one-quarter of these neonates will have CCHD (Mahle et al., 2009; Talner, 1998). Congenital heart disease is the most common cause of death in the first year of life, with defects accounting for 3% of all infant deaths and more than 40% of all deaths due to congenital malformations (Aamir, Kruse, & Ezeakudo, 2007; Knowles et al., 2005; Koppel et al., 2003; Lee et al., 2001).[8] Approximately 70% of infant deaths attributable to congenital heart defects in United States during 2003- 2006 occurred in the neonatal period. The neonatal mortality rate attributable to congenital heart defects in United States was 2.0 per 10,000 live births during that time period.[9]

During 1998–2005 there were 3,240 infants identified with CHD and 398,140 live births in metropolitan Atlanta. The overall prevalence of CHD was 81.4 infants/10 000 births, and the prevalence of critical CHD was 15.6 infants/10 000 births. The left to right shunt lesions were the most prevalent group of defects, comprising over half of the total number of CHD. The most common defect was muscular VSD occurring at a prevalence of 27.5/10 000 births. This prevalence was over twice that of the next two most common cardiac defects (perimembranous VSD at 10.6 and secundum ASD at 10.3/10 000 births). In the cyanotic CHD group, there were two predominant defects: TOF and TGA. TOF was the most common and twice as prevalent as TGA (4.7/10 000 births vs 2.3/10 000 births, respectively). The prevalence of all other cyanotic defects combined was 5.5/10 000 births. Among the obstructive CHD lesions, coarctation of the aorta (4.4/10 000) and HLHS (2.3/10000) were the two most common left heart obstructive defects, and pulmonary valvar stenosis (5.5/10 000) was a common right heart obstructive defect. All of these were within previously reported estimates. However, the observed prevalence of aortic valvar stenosis (1.1/10 000) and pulmonary atresia with intact septum (0.4/10 000) were below the lower quartiles reported by Hoffman and Kaplan.[7]

In India, going by the crude birth rate of 27.2/ 1000 (2001 census), the total live births are estimated at nearly 28 million per year. With a believed incidence rate of 8/ 1000 live births, nearly 180,000 babies are born with CHD each year in India. Of these, nearly 60,000- 90,000 suffer from CCHD requiring early intervention. Approximately 10% of present Infant Mortality may be accounted for by CHD alone.[10]

In the outpatient department of All India Institute of Medical Sciences, New Delhi, the neonates with CHD form about 10% of all CHD cases seen in 2004, an increase from less than 4% in 1991. The commonest CHD in neonates remains VSD. This is closely followed by PDA. TGA is seen in nearly one fifth of neonates having CHD. Pulmonary atresia and its variants are seen in about 13% of cases.[10]

With currently available treatment modalities, over 75% of children born with CCHD can survive beyond first year of life and lead normal life thereaftrer. However only less than 2% of total number of newborns and infants requiring heart surgery receive optimal treatment in India . Since the referral of these cases is often late, several of even these fortunate 2% have comorbid conditions like chest infection, severe pulmonary arterial obstruction, pulmonary vascular obstructive disease, etc.,there by increasing the perioperative mortality and morbidity. The remaining 98% of newborns probably donot survive. This will include large number of infants with potentially correctable lesions like VSD and PDA etc.[10]

Need for early diagnosis

Chang et al (2008) did a population-based retrospective study from 1989 to 2004 using California statewide death registry data and evaluated the rate, the clinical and demographic characteristics of missed diagnosis of CCHD. Their study cohort included 898 infants who died of CCHD at 1 to 364 days of age who either did not undergo surgery or had an unknown surgery status. Missed CCHD diagnosis was made if there was no clinical cardiac diagnosis before death and autopsy results were used to establish the cause of death. Of the 152 patients in the missed CCHD diagnosis group, 10 (6.6%) died at home and 68 (44.7%) died in the hospital emergency department. In the study cohort, HLHS was the most common cause of death (n=565 or 62.9% of the cohort). The overall incidence of missed CCHD diagnosis was 1.7 per 100 000 live births. Both HLHS(n=58) and coarctation of the aorta (n=41) accounted for roughly two-thirds of the patients with a missed CCHD diagnosis. Where as only 58 of the original cohort of 565 selected patients with HLHS (10%) were identified as having a missed CCHD diagnosis, 41 of 90 patients with coarctation of the aorta (46%) from the original cohort had a missed diagnosis. The median age at death was 11 days for the patients with HLHS and 17 days for the patients with coarctation of the aorta.[11]

Tenesse task force on screening newborns for CCHD states that the total incidence of CCHD to be between 110 and 120 in 100 000 live births. However, not all infants born with AS or COA will have a critical stenosis, leaving ~60 in 100 000 that are ductal dependent. Many of these patients, however, will be identified by either prenatal ultrasound or clinical evaluation before discharge home. It was estimated that 8% of this value (5 in 100 000 live-born infants) is a conservative value for missed diagnoses in patients who present alive. On the basis of studies that include community searches for autopsy records, an additional 5% to 8% (4 in 100 000) of patients with one of these conditions will not receive a diagnosis before their death, yielding 9 in 100 000 live-born infants as the incidence of missed ductal dependent left-sided obstructive lesions. To summarize, the total incidence of critical congenital heart disease is ~170 in 100 000 live births, and of those, an estimated 60 in 100 000 have left-sided obstructive lesions, and 9 in 100 000 of them have the condition undiagnosed at discharge home, one half of whom die before receiving the diagnosis.[4]

The severity of organ damage is a function of the extent of insult, differential flow to organs as the neonatal circulation responds to the hypoxic/ ischemic insult, and the oxygen requirement of each organ. Among sequelae of neonatal hemodynamic compromise, the most important long-term effects relate to the consequences of brain injury from ischemia and reperfusion, because the brain has the highest oxygen requirement of any organ. Cerebrovascular pressure autoregulation and reactivity to CO2 are affected by hypoxic/ischemic injury, which renders the brain particularly vulnerable to hypotension and decreased cardiac output. Such hemodynamic instability is prevalent among neonates with CCHD who present with shock. Furthermore, preoperative events may interact with genetic mutations and both intraoperative and postoperative factors in determining later neurodevelopmental outcome.[12]

Using brain magnetic resonance imaging, a number of investigators have demonstrated acute brain injury in the newborn with CCHD before surgical intervention. Periventricular leukomalacia, which occurs secondary to vulnerability of the immature oligodendrocyte to hypoxia/ischemia, free radical attack, and excitotoxicity, and likely circulating cytokines, has been found on magnetic resonance imaging in up to 39% of neonates with CCHD.[12]

Children with CCHD are reported to experience more frequent impairments in motor function, speech and language, visual-motor-perceptual function, and executive function, as well as increased use of special services. The greatest frequency of adverse outcomes is found among those with a single ventricle with obstruction to systemic outflow, such as hypoplastic left heart syndrome. In this lesion, systemic perfusion occurs through the patent ductus arteriosus, and ductus closure results in shock and end-organ damage. Prenatal diagnosis of hypoplastic left heart syndrome has been reported in certain studies to reduce early neurological morbidity, with fewer adverse perioperative neurological events such as coma, although earlier age at surgery has not been shown to result in better long-term neurodevelopmental outcomes. One could infer that because delayed diagnosis is associated with damage to various end organs, it might also lead to hypoxic/ischemic brain injury; however, further studies are needed to demonstrate a true causal relationship.[12]

Mahle et al analyzed the neurologic outcome of patients with HLHS on the basis of varying modes of presentation and found that of those who received the diagnosis prenatally, 15% exhibited perioperative seizures or coma, compared with 26% who received the diagnosis postnatally. Of those patients sent home without the diagnosis, 46% developed seizures or coma (William Mahle, MD, personal communication, 2005). It is well established that perioperative seizures and coma are strong predictors for neurodevelopmental outcome in this patient population. It can conclude, therefore, that an effective screening program would not only impact mortality but would prevent serious neurologic morbidity in this population.[4]

CRITICAL CONGENITAL HEART DISEASE AS A TARGET FOR SCREENING

From a modification of the criteria originally developed by Wilson and Junger in 1968, it is considered a newborn screening (NBS) program to be effective if:

1) the incidence of the condition in the newborn population is sufficient to warrant screening;

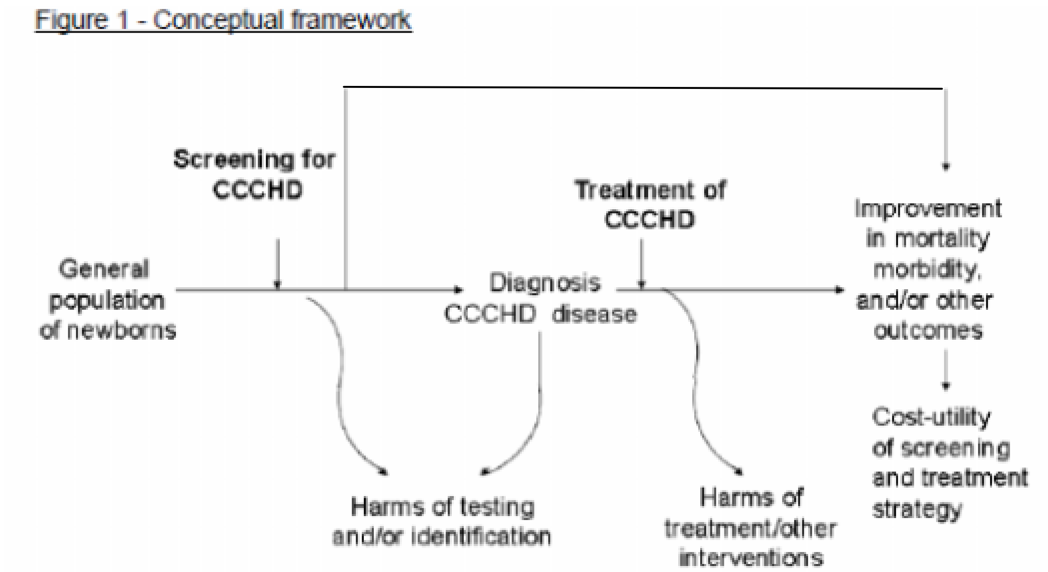
2) therapy provided to the patient before onset of clinical manifestations results in an improved outcome.

3) the screening test is able to identify the patient while he or she is yet asymptomatic;

4) the test has acceptable sensitivity and false-positive rates; and

5) the cost of screening (financial and nonfinancial) is reasonable in light of the limited health care resources available and the large number of additional health care needs currently competing for funds.[4]

Figure 1: CONCEPTUAL FRAMEWORK OF SCREENING FOR CCHD[8]



Effective prevention of congenital heart disease seems unlikely to emerge within the next decade, so that any policy designed to reduce death and disability from congenital heart disease must at present be focused on management during the early months of life. Cardiac catheterisation and surgery are not cheap when viewed in isolation, but there can hardly be another specialty where such sick individuals are so completely restored to normality for such a long time. So the cost-benefit ratio, in so far as this can be quantified, is probably low compared with many other widely performed procedures.[13]

Tenesse task force on newborn screening for CCHD calculated that total incidence of critical congenital heart disease is ~170 in 100 000 live births, and of those, an estimated 60 in 100 000 have left-sided obstructive lesions, and 9 in 100 000 of them have the condition undiagnosed at discharge home. For the state of Tennessee with 80 000 live births per year, these values correspond to 136 infants per year born with a critical heart defect, 48 with a critical left heart obstructive lesion and 7 with a missed critical left heart lesion. By comparison, the Tennessee metabolic screening program yearly identifies ~50 confirmed cases of neonatal hypothyroidism, 26 cases of galactosemia, 5 of phenylketonuria, 5 of biotinidase deficiency, 0 of maple syrup urine disease, and 0 of homocystinuria. This comparison suggests that if an effective screening method exists, the incidence numbers would warrant implementation of such screening.[4]

METHODS FOR EARLY DIAGNOSIS- MERITS & PITFALLS

Children with CCHD are identified in a variety of ways. Since the late 1980s, prenatal ultrasound has been used to screen for congenital anomalies. An anatomic ultrasound is typically performed at 18 to 20 weeks' gestation. Prenatal ultrasound, performed by those with specific training in congenital heart disease, can identify a variety of CCHD lesions; however, numerous studies have reported that even when fetal ultrasound is routinely performed during pregnancy, fewer than 50% of cases of CCHD are identified.[12]

In the United States, many congenital surgery referral centers have reported prenatal detection rates ~ 50% for functional single-ventricle lesions, although the detection rate is generally ~ 30% for CCHD lesions with 2-ventricle circulation. These studies from referral centers may be biased toward higher detection rates, and population-based data on prenatal detection of CCHD in the United States are sparse.[12]

There are several factors that might account for the relatively low prenatal CCHD detection rate. The quality of anatomic ultrasounds varies considerably. A number of medical professionals, including radiologists, perinatologists, and general obstetricians with varying degrees of training, as well as technicians, perform these ultrasounds. In addition to concerns about the quality, there may be limited access to prenatal ultrasound. Therefore, although prenatal ultrasound plays an important part in the timely identification of CCHD, population-based data demonstrate that this methodology by itself is insufficient to identify a high proportion of cases.[12]

After birth, screening for congenital heart disease by primary care providers is currently accomplished by physical examination within the first 24 hours of life and on subsequent nursery visits. Neonates with CCHD may be diagnosed in the newborn nursery on the basis of physical examination findings, such as heart murmurs, tachypnea, or overt cyanosis. These findings are not always evident before hospital discharge, which may occur before 48 hours of life. Supplemental tests, including electrocardiograms, pulse oximetry, and chest radiographs, are often obtained in suspicious cases. Echocardiograms can be done either with or without pediatric cardiology consultation. This strategy blends diagnostic assessment approaches from the 1950s to 1970s with the increasing availability of echocardiography. It results in substantial case identification but is regarded as inefficient and costly and misses a significant number of newborns with CCHD. Skilled physical examination, a sensitive and specific screening tool in older children, does not always distinguish between neonates with and without congenital heart disease. Hypoxemia is difficult to detect in newborns, and the transitional circulation masks important clinical findings such as absent femoral pulses while the ductus arteriosus remains patent. Reports of the late detection of coarctation of the aorta have been published since the 1960s. Perhaps most importantly, physical examination skills are on the decline in current trainees. [12]

Heart murmurs have a prevalence of between 0.6% and 4.2% in newborns and are mistakenly considered a hallmark of heart disease. They often do not accompany critical heart defects, particularly those with valve atresia and transposition. Flow murmurs of the transitional circulation, transient tricuspid regurgitation, and small ventricular septal defects are common and of no clinical importance in newborns. Conversely, murmurs of many important complex heart defects, such as tricuspid atresia with ventricular septal defect, double-outlet right ventricle, and total anomalous pulmonary venous return, emerge only after the decline in pulmonary resistance and after neonatal discharge and are often heard but not considered pathological. Practicing pediatricians currently have limited experience in discriminating innocent from pathological murmurs.[12]

In a contemporary series in which echocardiography was performed to evaluate for possible heart disease based on suspicious physical examination, fewer than 15% of subjects were found to have significant congenital heart disease. Clinical experience and epidemiological observations suggest that although physical examination, electrocardiogram, and chest radiograph are useful in identifying many cases of serious congenital heart disease postnatally, they do not have sufficient sensitivity and specificity to detect all cases.[12]

Echocardiography, although an essential diagnostic tool, has serious limitations as a universal screening tool, particularly its cost. When used as a screening tool, echocardiography has a high frequency of either falsepositive results (usually related to the transitional circulation) or recognition of clinically benign diagnoses (eg, small muscular ventricular septal defects). In addition, there may be an inadequate supply of trained personnel who could perform this screening with a reasonable degree of accuracy. Therefore, there is considerable interest in improving the detection of CCHD with novel diagnostic techniques.[12]

PULSE OXIMETRY FOR EARLY DIAGNOSIS

The majority of CCHD lesions present with some degree of hypoxemia in the newborn period. Hypoxemia results from the mixing of systemic and venous circulations or parallel circulations as one might see in dextro-transposition of the great arteries. Hypoxemia may result in obvious cyanosis. However, generally, 4 to 5 g of deoxygenated hemoglobin is needed to produce visible central cyanosis, independent of hemoglobin concentration. For the typical newborn with a hemoglobin concentration of 20 g/dL, cyanosis will only be visible when arterial oxygen saturation is <80%; if the infant only has a hemoglobin concentration of 10 g/dL, the saturation must be <60% before cyanosis is apparent. Importantly, those children with mild hypoxemia, with arterial oxygen saturation of 80% to 95%, will not have visible cyanosis. Moreover, the identification of cyanosis is particularly problematic in black and Hispanic neonates because of skin pigmentation. To improve timely detection of CCHD, a number of investigators have proposed that pulse oximetry be considered as a complementary modality to the newborn physical examination.[12]

Infants with HLHS after delivery have systemic oxygen desaturation. Clinical cyanosis may not be evident, however, and these infants are initially asymptomatic with normal perfusion and respiratory rates. As the pulmonary vascular resistance decreases, oxygen saturation levels typically rise, and these neonates may develop tachypnea and diminished distal perfusion. This trend is compounded by constriction of the ductus arteriosus or failure of the right ventricle, culminating in acidosis and shock. Thus patients with the left-sided obstructive lesions may have normal upper extremity oxygen saturation measurements after delivery; however, their lower limbs should show desaturation as a result of partial or complete perfusion via the ductus arteriosus. Lower-extremity pulse oximetry would seem to be a useful tool in the identification of critical ductal-dependent left-sided obstructive lesions in the asymptomatic neonate.[4]

Pulse oximetry has the potential to identify hypoxemia that might not otherwise produce visible cyanosis, especially among darkly pigmented newborns. Pulse oximetry is used routinely in the assessment of young children in neonatal intensive care units and emergency departments and has been proposed as an adjunct to the assessment of the newborn in the delivery room. As such, some have proposed that pulse oximetry be considered as a vital sign equivalent in importance to pulse, respirations, and blood pressure.[12]

PULSE OXIMETER- EQUIPMENT

Pulse oximetry was developed in the early 1970s based on the different absorption spectra between oxygenated and deoxygenated hemoglobin. Reduced hemoglobin absorbs light in the red band (600 to 750 nm), whereas oxygenated hemoglobin absorbs light in the infrared band (850 to 1000 nm). The ratio of light absorbance at these 2 wavelengths correlates with the saturation of hemoglobin in the capillaries.[12]

Probe of pulse oximeter consists of two diodes which emit equal intensities of red and infrared light in sequence into pulsatile tissue bed. Variable amount of these lights are absorbed by oxygenated and reduced hemoglobin. A photodetector placed on the opposite side senses the ratio of red and infrared light based on which the proportion of oxygenated and reduced hemoglobin is estimated by an in built micro-processor and digitally displayed.[14]

The gold standard for estimation of oxygenation, is the determination of partial pressure of oxygen (PaO2) by Co-oximetry, which is the principle used in blood gas analysers. The fundamental difference between pulse oximetry and co-oximetry is that pulse oximetry accounts for only oxyhemoglobin and reduced hemoglobin, where as in co-oximetry other forms of hemoglobin like methhemoglobin, cyanhemoglobin are also taken into consideration. Hence pulse oximetry measures 'Functional hemoglobin saturation' (Functional SaO2 = HbO/ HbO+HbH x 100), while co-oximetry measures 'Fractional hemoglobin saturation' or 'Oxyhemoglobin fraction' (Fractional SaO2 = HbO/ HbO+HbH+COHb+MetHb x 100).[14]

DEMERITS OF PULSE OXIMETERS

In babies with HLHS, because of the high pulmonary/systemic flow ratios, oxygen saturation values may be in the normal range even during the later stages. Thus patients with the left-sided obstructive lesions may have normal upper extremity oxygen saturation measurements after delivery; however, their lower limbs should show desaturation as a result of partial or complete perfusion via the ductus arteriosus.[4]

This screen may be falsely negative, however, until the pulmonary vascular resistance decreases or the ductus becomes restrictive and, thus, must be used within the context of the patient's clinical status. There is the potential that this screen could provide a false reassurance if not applied properly.[4]

IMPLICATIONS OF SCREENING WITH PULSE OXIMETERS

Most newborns with CCHD can be diagnosed by echocardiography, palliated with prostaglandin infusion, and treated with surgery or transcatheter interventions. In the current era, congenital heart surgery allows for repair or palliation of nearly all types of congenital heart malformations. Congenital heart surgery, together with transcatheter interventions, has resulted in a marked improvement in survival for those with CCHD. Intervention is typically performed in the first weeks of life to optimize hemodynamics and prevent end-organ injury associated with delayed diagnosis. Because timely recognition of CCHD could improve outcomes, it is important to identify and evaluate strategies to enhance early detection.[12]

AMERICAN ACADEMY OF PEDIATRICS RECOMMENDATION

Pulse oximetry screening can identify some newborns with critical congenital heart defects (CCHDs, which also are known collectively in some instances as *critical congenital heart disease*). While several defects could be considered CCHDs, in the context of newborn pulse oximetry screening, seven defects are classified as CCHD: hypoplastic left heart syndrome, pulmonary atresia (with intact septum), tetralogy of Fallot, total anomalous pulmonary venous return, transposition of the great arteries, tricuspid atresia, and truncus arteriosus. These seven CCHDs represent about 17-31% of all congenital heart disease. All of these defects require some type of intervention—often involving a surgical procedure—soon after birth.[15]

Without screening, some newborns with CCHDs might be missed because the signs of CCHD might not be evident before an infant is discharged from the hospital after birth. Other heart defects might be considered secondary screening targets.

Some of these heart defects can be just as severe as the primary screening targets and also require intervention soon after birth. However, pulse oximetry screening may not detect these heart defects as consistently as the seven disorders listed as primary targets. These secondary targets include aortic arch atresia or hypoplasia, interrupted aortic arch, coarctation of the aorta, double-outlet right ventricle, Ebstein anomaly, pulmonary stenosis, atrioventricular septal defect, ventricular septal defect, and single ventricle defects (other than hypoplastic left heart syndrome and tricuspid atresia).[15]

On September 21, 2011, the Secretary of Health and Human Services (HHS), Kathleen Sebelius, recommended that screening for CCHD be added to the recommended uniform screening panel (RUSP). This recommendation was based in large part on the Secretary's Advisory Committee on Heritable Disorders in Newborns and Children's recommendations and a 2-day comprehensive evidence review of screening strategies by national and international stakeholders. The American Academy of Pediatrics (AAP) strongly supports the decision of the Secretary of HHS to add screening with pulse oximetry to the RUSP. The AAP has been a vigorous advocate of early detection of CCHD to prevent childhood deaths or injury that might occur as a result of late detection.

The highlights of screening implementation are as follows:

1) The screening is targeted toward healthy newborn infants in the newborn nursery.
2) Screening should be performed with motion-tolerant pulse oximeters. It is appropriate to use either disposable or reusable pulse oximetry probes.

3) Screening should not be undertaken until 24 hours of life or as late as possible if early discharge is planned to reduce the number of falsepositive results. Separate consideration for home births is necessary.
4) Oxygen saturations should be obtained in the right hand and one foot. Threshold for a positive screening result relates to both the absolute reading by the pulse oximeter as well as the difference between the 2 extremities. Screening that has a pulse oximetry reading of ≥95% in either extremity with a ≤3% absolute difference between the upper and lower extremity would be considered a pass, and the screening would end. It is recommended that repeated measurements be performed in those cases in which the initial screening result was positive, again in an effort to reduce false-positive results. Infants with saturations <90% should receive immediate evaluation. It is important to note that the oxygen saturation thresholds for a positive screening result may vary at high altitude. Appropriate studies need to be performed at high altitude to establish reliable thresholds.
5) In the event of a positive screening result, CCHD needs to be excluded with a diagnostic echocardiogram. Infectious and pulmonary causes of hypoxemia should also be excluded.[16]

PERFUSION INDEX

Perfusion index is an assessment of the pulsatile strength at a specific monitoring site (e.g. the hand, finger or foot), and as such PI is an indirect and noninvasive measure of peripheral perfusion. It is calculated by means of pulse oximetry by expressing the pulsatile signal (during arterial inflow) as a percentage of the nonpulsatile signal, both of which are derived from the amount of infrared (940 nm) light absorbed. Thus perfusion index (PI) is the ratio of the pulsatile blood flow to the nonpulsatile or static blood in peripheral tissue.[17]

Perfusion Index thus represents a noninvasive measure of peripheral perfusion that can be continuously and noninvasively obtained from a pulse oximeter. In the neonatal acute care setting, a low PI has been shown to be an objective and accurate measure of acute illness. Additionally, PI measurement represents a more rapid and inexpensive method to assess peripheral perfusion and circulatory status in comparison to evaluating calf muscle perfusion and oxygen consumption by way of near-infrared spectroscopy.[17]

Changes in PI can also occur as a result of local vasoconstriction (decrease in PI) or vasodilatation (increase in PI) in the skin at the monitoring site. These changes occur with changes in the volume of oxygenated bloodflow in the skin microvasculature. The measurement of PI is independent of other physiological variables such as heart rate variability, SaO2, oxygen consumption, or temperature. The interpretation of PI depends on the clinical context to which it is applied. The PI generally changes in proportion to peripheral perfusion. When used in conjunction with oxygen saturation and pulse rate, a diminished PI becomes an important indicator of chorioamnionitis in term newborns—a condition that is often subclinical and associated with neonatal morbidity and mortality.[17]

MASIMO SIGNAL EXTRACTION TECHNOLOGY

Conventional pulse oximeters assume that arterial blood is the only blood moving (pulsating) in the measurement site. During patient motion, however, the non-arterial blood also moves, causing conventional pulse oximeters to read low values, because they cannot distinguish between the arterial and venous blood movement (sometimes referred to as noises).[14]

Masimo Signal Extraction Technology(SET), patented by Masimo Corporation, United States of America, enables accuracy of SpO2 measurement during low perfusion states, movement and noise artifacts. While conventional pulse oximeter employs one or two algorithms to attempt to measure patient arterial saturation, Masimo SET employs five algorithms using adaptive filters, working in parallel to ensure accurate measurement in difficult situation like motion or low perfusion.[14] Thus Masimo SET pulse oximetry utilizes parallel engines and adaptive digital filtering. Adaptive filters are powerful because they are able to adapt to the varying physiologic signals and/or noise and separate them by looking at the whole signal and breaking it down to its fundamental components. The Masimo SET signal processing algorithm, Discrete Saturation Transform (DST) reliably identifies the noise, isolates it and, using adaptive filters, cancels it. It then reports the true arterial oxygen saturation for display on the monitor.[17] This technology will work during patient motion artifacts, low perfusion states with low signal output and during intense ambient light exposure. So this technology filters out the desired signal while discarding the unwanted noise signals, thereby making the saturation estimate more accurate in situations where conventional pulse oximeters fails.[14]

Masimo SET pulse oximetry yields continual and simultaneous absolute values and trends with associated alarms for PI, functional oxygen saturation (SpO2), and pulse rate using validated signal extraction technology. Because SET technology utilizes five signal processing algorithms to deliver high precision sensitivity and specificity in the measurement of blood oxygen saturation levels, the PI parameter can be derived from the core measurements of SET and yields clinically useful information regarding the peripheral perfusion status of the patient.[17]

Further there are now next generation pulse oximeters by Masimo- the Rainbow SET pulse Co-Oximetry, which uses seven algorithms, enabling this device to measure non invasively the total hemoglobin (Sp Hb), respiratory rate, Pleth variability index (PVI), oxygen content, and levels of Carboxy hemoglobin (SpCO) and methemoglobin (Sp Met). [14]

ROLE OF COMBINED PI & SPO2

Many new generation pulse oximeters now also display a peripheral perfusion index, which records what proportion of saturated haemoglobin in the blood displays pulsatile flow (that is, is roughly proportional to pulse volume). Granelli et al have published normal values for this index in healthy newborns, and showed that peripheral perfusion index is pathologically low (<0.70) in 5/9 infants with duct dependent obstruction of the left heart or aortic arch. Incorporating cut-off values for perfusion index into routine pulse oximetry screening would probably increase sensitivity for detection of left heart obstructive disease, but the implications for the false positive rate would have to be assessed.[18]

ROLE OF COMBINED CLINICAL EXAMINATION & SPO2

Granelli at al in their study found that poor or absent femoral pulses was the alerting sign in half of those children with duct dependant systemic circulation and contributed to the detection of two babies with duct dependent systemic circulation who would otherwise have been missed with oximetry screening. Even among the

13 babies whose oximetry results were revealed to the examining physician, poor femoral pulses was an important indicator of duct dependent systemic circulation in six infants.[18]

As different cases were missed by clinical examination and by pulse oximetry, the combination of neonatal physical examination and oximetry screening had a higher sensitivity than either of the methods individually (82.76% (95% confidence interval 64.23% to 95.15%)), although the higher number of false positives from physical examination lowered the positive predictive value to 2.92 (1.98 to 4.31).[18]

ECONOMIC CONSIDERATIONS

Costs of pulse oximetry screening include screening equipment, supplies associated with screening (e.g., probes, adhesive wraps), and staff time needed to perform screening, track results, and communicate with parents.

- Screening has been estimated to cost \$5.00 to \$10.00 per infant.
- The time required for each screen is about 1 to 5 minutes.

Costs associated with diagnosis and follow-up of infants with out-of-range (positive) results are not included in these estimates. For example, an echocardiogram to verify an out-of-range (positive) screen could cost several hundred dollars.[15]

The financial costs of a screening program, as analysed by The Tennessee Task Force include:

1. cost of screening per patient: equipment, personnel, training, local and statewide administration fees, and others (the purchase cost of a late-model pulse oximeter is approximately \$900, excluding sensors);

2. false-positive management costs: additional hospitalization time, potential transport costs, and cardiac evaluation fees (usually including an echocardiogram); and

3. additional management costs resulting from patients who currently present dead before diagnosis.

The financial benefits are:

1. shorter hospitalization times of those currently presenting in shock with multiorgan failure;

2. rehabilitation cost savings for those whose presentation has resulted in neurologic morbidity; and

3. long-term productivity gains from those who will be able to provide for themselves rather than requiring chronic care.

There are also nonfinancial costs of screening that may be important:

1. emotional stress to parents of infants who undergo unnecessary cardiac evaluation with possible prolonged hospitalization and transport issues because of false-positive results;

2. strains to transport infrastructure, NICUs, and cardiology services; and

3. the impact of false-negative results (neurologic morbidity, death, emotional factors, and legal implications).

Balancing these nonfinancial costs are the benefits of a neurologically intact child, which are incalculable. The implications of a false-positive or false-negative result are considerably more profound for left-sided obstructive lesions, with neonatal death being the ultimate consequence. As a result, there are many practical medical, financial, and legal questions that arise should a screening program for critical congenital heart disease be implemented.[4]

STUDY JUSTIFICATION

Early detection of CCHD in the asymptomatic period immediately after birth will reduce clinical deterioration by instigation of appropriate, timely management. Currently infants are screened to detect congenital heart disease by physical examination after birth and another examination at six to eight weeks. However, this method of screening fails to detect up to 50% of CHDs at birth.[1]

Pulse oximetry has been proposed as an alternative screening method for the detection of CCHDs. It is proposed that the measurement of oxygen saturation identifies infants with mild cyanosis who do not have an audible murmur or other signs of cardiac abnormality and are not detected by routine clinical examination. Several studies have reported the use of pulse oximetry as a screening tool for the detection of CHD. On the basis of the eight studies, the summary estimates of sensitivity and specificity were 63% (95% CI 39% to 83%) and 99.8% (95% CI 99% to100%), respectively, yielding a false positive rate of 0.2% (95% CI 0% to 1%).[1]

However, a published analysis of oximetry has indicated the difficulty in detecting hypoplastic left heart syndrome, aortic stenosis, and coarctation of the aorta, which are at greatest risk for acute cardiovascular compromise, limiting the usefulness of this screening tool.[12] A >3% difference between preductal and postductal saturation substantially increases the likelihood of a duct dependent systemic circulation being present.[18]

Many new generation pulse oximeters now available also display a peripheral perfusion index (PI), which records the proportion of saturated haemoglobin in the blood displaying pulsatile flow (which is, roughly proportional to pulse volume).

Granelli et al have published normal values for this index in healthy newborns, and showed that peripheral perfusion index (PI) is pathologically low (<0.70) in infants with duct dependent obstruction of the left heart or aortic arch. Thus PI values might be a useful additional tool for early detection of LHOD.[19]

Duct dependent systemic circulation is more often missed than duct dependent pulmonary circulation and is the most common cause of death in the community from unrecognized critical heart disease. Thus incorporating cut-off values for perfusion index into routine pulse oximetry screening would probably increase sensitivity for detection of left heart obstructive disease.[18]

RESEARCH HYPOTHESIS

Combining perfusion index and pulse oximetry for screening may improve the identification of critical congenital heart disease in asymptomatic newborn babies.

RESEARCH QUESTION

Will the combination of perfusion index and pulse oximetry, improve the screening for critical congenital heart disease in asymptomatic newborn babies?

AIM OF THE STUDY

To study the role of pulse oximetry and perfusion index in screening for critical congenital heart disease in asymptomatic newborn babies at 24-72 hrs of life

METHODOLOGY

STUDY DESIGN

Prospective descriptive study

STUDY PLACE

Postnatal and post caesarean wards of Institute of Obstetrics & Gynecology and Hospital for women & children (IOG), Egmore, Chennai

STUDY PERIOD

October 2011- January 2012 (4 months period)

INCLUSION CRITERIA

All babies born during the study period and are asymptomatic at 24- 72 hrs of life, being nursed with their mother in the postnatal and post caesarean wards of IOG.

EXCLUSION CRITERIA

Asymptomatic babies under evaluation for early onset sepsis.

STUDY DESCRIPTION

Parents of all babies in postnatal and post caesarean wards who satisfy the inclusion criteria were approached for the study. Written, informed consent was obtained from either parent, who were willing to participate in the study. Baseline demographic data was obtained. Then clinical examination was done by the principal investigator and the following points were noted: any dysmorphic features, central cyanosis, respiratory distress, location of apical impulse by palpation, feel for the femoral pulses on both sides and any grade ≥3/6 murmur in precordium.

The new generation of pulse oximeter with signal extraction technology (Masimo, Radical-7, Signal extraction pulse Co-Oximeter with rainbow technology) was used for recording Functional hemoglobin saturation percentage(SpO_2) and perfusion index (PI). The instrument displays the pulse wave form, heart rate, SpO_2 and PI. The reusable neonatal probe was applied in the right hand (Preductal area) and in left foot (Postductal area), when the baby was calm and quiet. The pulse oximetry saturation (SpO_2) and perfusion index (PI) was recorded, once the monitor's display panel shows regular pulse waves. The probe was cleaned with spirit between babies.

An oxygen saturation measure less than 90% in the right hand or left foot was considered a positive screen (in the initial screen or in repeat screens).

An oxygen saturation measure of 95% or greater in the right hand or left foot, with 3% or less absolute difference in oxygen saturation between the two limbs and perfusion index of 0.7 or above in right hand and left foot was considered a negative screen (in the initial screen or in repeat screens), and screening ends.

If the oxygen saturation was 90% or above but less than 95% in the right hand and foot or the absolute difference in oxygen saturation between the two limbs was greater than 3% or the perfusion index was less than 0.7 in right hand or left foot, the screen was repeated in an hour. If the second measures were in the same range, the screen was again repeated in an hour. A third measure of oxygen saturation 90% or above but less than 95% in the right hand and foot or absolute difference in oxygen saturation between the two limbs greater than 3% or perfusion index of less than 0.7 in right hand or left foot was then considered a positive screen.

A screen was considered positive if any one of the following condition exists:

(1) any oxygen saturation measure was <90% (in the initial screen or in repeat screens)

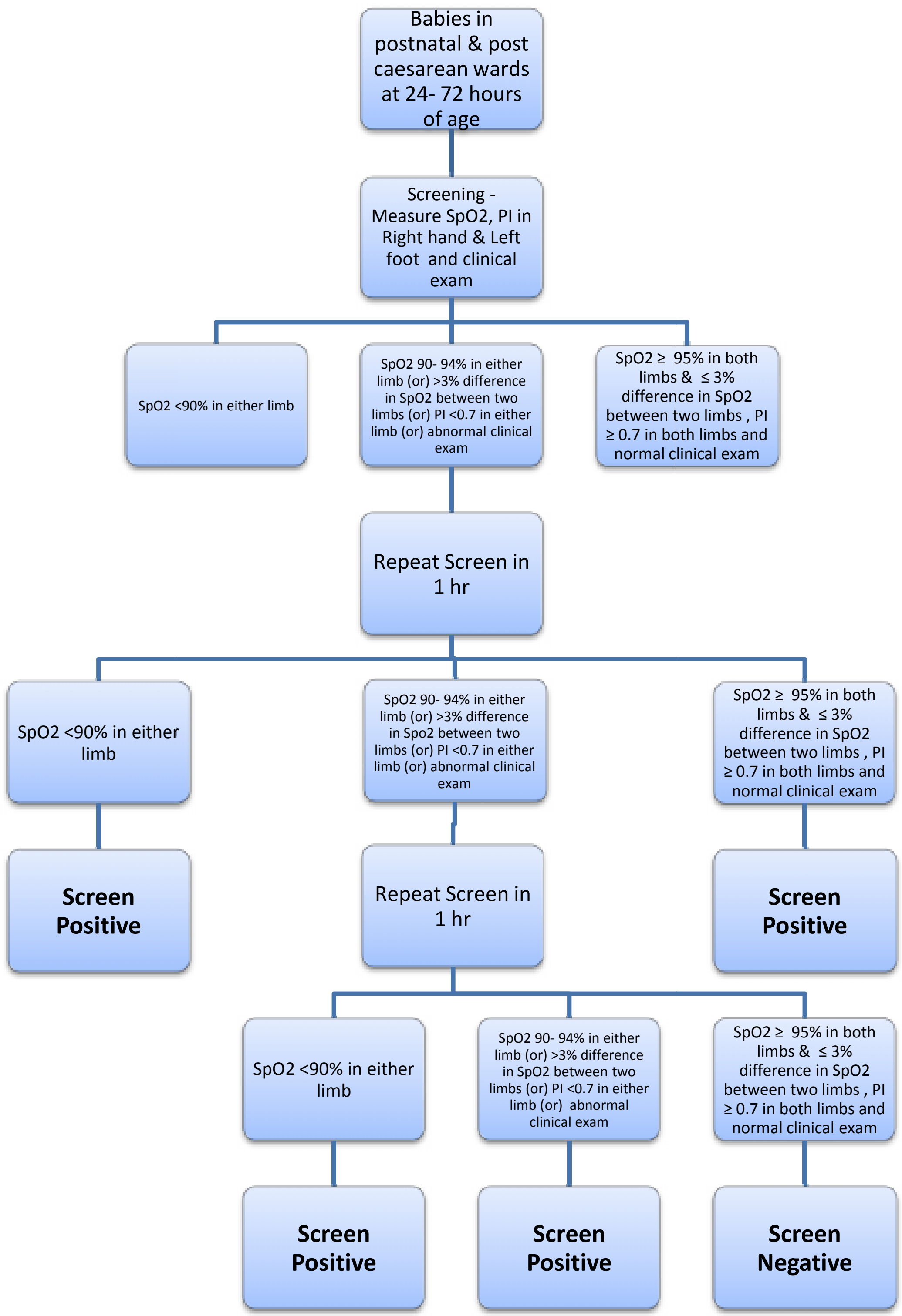
(2) oxygen saturation was <95% in the right hand and left foot on three measures, each separated by one hour.

(3) a >3% absolute difference exists in oxygen saturation between the right hand and left foot on three measures, each separated by one hour.

(4) perfusion index of less than 0.7 on three measures, each separated by one hour.

If any of the repeat screens at hourly interval shows oxygen saturation of ≥95% in the right hand or foot with a ≤3% absolute difference in oxygen saturation between the two limbs and perfusion index of 0.7 and above in both limbs, it was considered a negative screen and the screening would end.

Figure 2: ALGORITHM OF FLOW OF CASES THROUGH THE STUDY PROCESS



All babies with positive screening was referred to Pediatric cardiologist for opinion and echocardiography. In addition, any baby who has features suggestive of CHD namely central cyanosis, persistent respiratory distress, abnormal location of apical impulse, feeble or absent femoral pulses and ≥ grade 3/6 precordial murmur were also referred for pediatric cardiologist opinion. Echocardiography was done by pediatric cardiologist in the Pediatric cardiology department of Institute of Child health & hospital for Children. Philips Echocardiogram machine(ERVISION- HD-7 with pediatric probe and adult probe) was used for this purpose. The data was entered in predesigned proforma.

Cases were followed up at 6 weeks of age, when they attended the well baby clinic for review and first dose of DPT/OPV/Hep B vaccination. All such babies were enquired about their health status, any symptoms suggestive of heart disease, any intercurrent illness and any hospitalization in between. Then the babies were clinically examined for heart disease. Babies who had any finding suggestive of cardiac disease were planned to be referred to pediatric cardiologist for further evaluation and echocardiography.

If any baby does not turn up for follow up at 6 weeks of age, then the parents were contacted through phone and were enquired about the health status of the baby and reminded about the follow up visit. Some babies who could not be contacted by phone were sent a reminder letter by post. The babies who could not be contacted by phone or post were planned to be considered as drop outs. The details will be noted in the proforma.

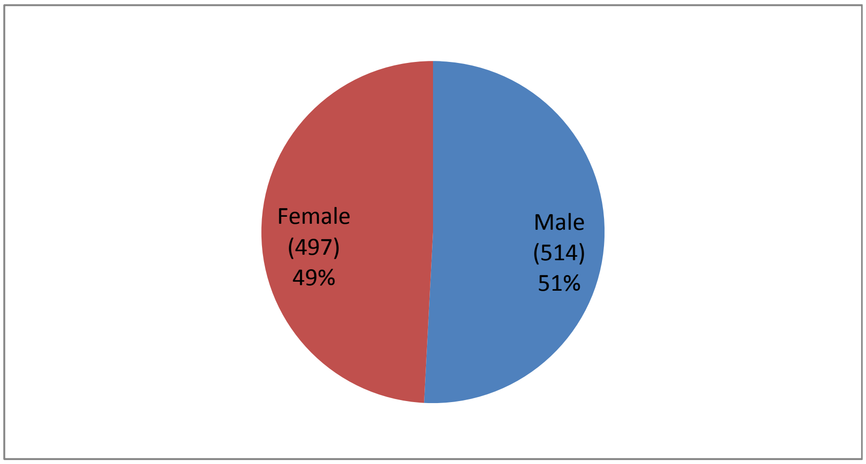
STATISTICAL ANALYSIS

Sensitivity, specificity, positive predictive value and negative predictive value for clinical examination, pulse oximeter saturation, perfusion index was calculated individually and in combination using OpenEpi, Version 2, Open source calculator for Diagnostic tests. Categorical data were analysed with two tailed Fisher's exact test for small groups and Chi square test for large population using SPSS version 16.

RESULTS

A total of 1,011 babies out of 1,059 eligible babies were screened over a period of four months. Forty eight babies were not screened due to early discharge of mother before 24 hrs of life due to various reasons. There were almost equal number of male and female babies (Male to female ratio= 1.03:1).

Figure 3: <u>GENDER DISTRIBUTION OF CASES</u>



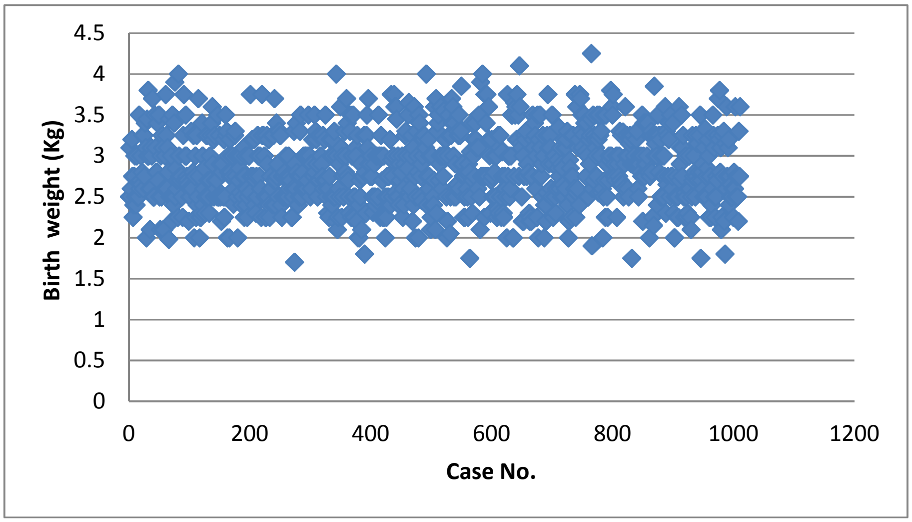
The study population had a mean birth weight was 2.85 kg.

TABLE 1: <u>BASELINE CHARACTERISTICS OF THE STUDY POPULATION</u>

VARIABLES	**OBSERVATION**
Male: Female Ratio	1.03: 1 (p= 0.687)*
Mean Birth Weight (Mean ± SD)	2.85 (± 0.44) Kilo grams
Mean age at screening (Mean ± SD)	34.03(± 10.5) Hours
Mode of delivery	LN- 453; LSCS- 532; Assisted breech- 3; Outlet forceps- 17; Vaccum- 6 (p=0.457)*

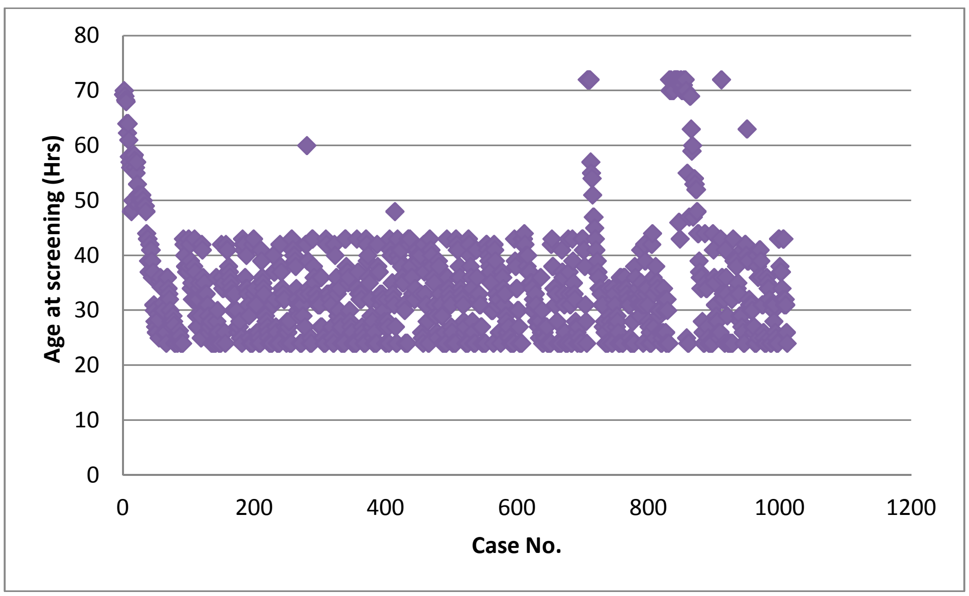
*p < 0.05 is statistically significant

Figure 4: BIRTH WEIGHT DISTRIBUTION OF STUDY POPULATION



Mean time of screening was 34 hours of life.

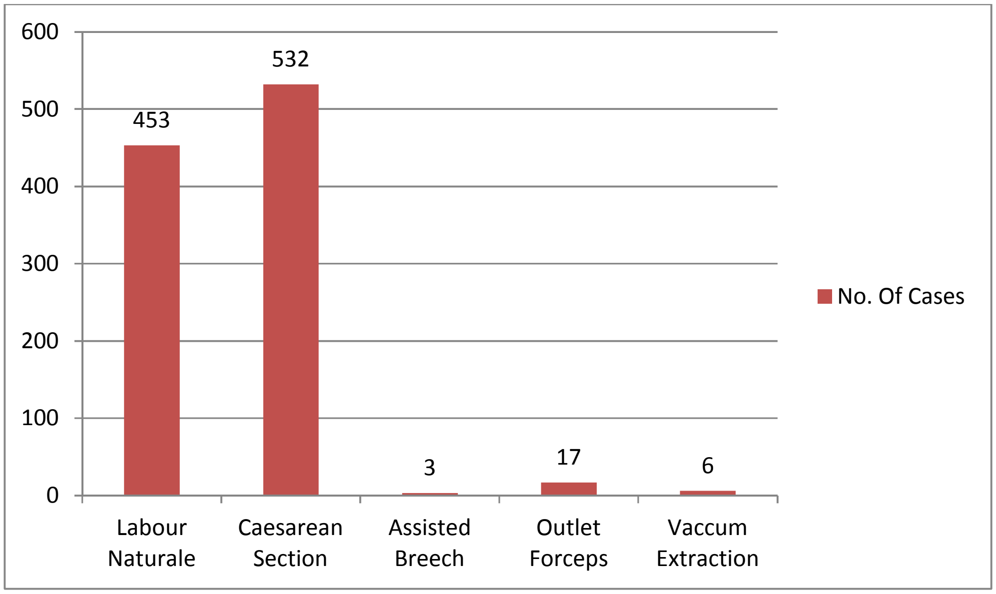
Figure 5: AGE DISTRIBUTION OF CASES AT TIME OF SCREENING



Three babies had significant findings in antenatal ultrasound scan: two had features of structural heart defect by fetal echo and one had features of Complete heart block with slow fetal heart rate.

More than fifty percentage of babies (52.6%) were delivered by Caesarean section. 44.8% of babies were delivered by labour natural, 1.7% by outlet forceps, 0.6% by vaccum extraction and 0.3% by assisted breech delivery.

Figure 6: <u>DISTRIBUTION OF CASES BY MODE OF DELIVERY</u>



Four babies had dysmorphic features: one had the phenotypic features of Down syndrome and the other three had preauricular skin tag. None of them had features of CHD.

None of our babies had clinically evident cyanosis or respiratory distress. All babies had a normally located apical impulse and well palpable femoral pulses. Three babies had systolic murmur in left lower sternal border. Of them one baby had a low SpO2 recording and later echo identified TOF in this baby. The other two babies had normal SpO2 and PI recording and these babies had VSD on echocardiography. Thus the clinical examination has identified one Critical CHD and two non critical CHDs. Clinical examination revealed slow heart rate in one baby. This baby with congenital complete heart block was identified antenatally during routine scan. One baby had a normal screening examination but later developed a systolic murmur on fifth day of life without any symptoms and echo showed VSD. Though this case was missed by the screening test, it is not a critical CHD.

Table 2: <u>SUMMARY OF THE RESULTS OF THE STUDY</u>

VARIABLES	**OBSERVATION**
Total No. of babies screened	1,011
SpO2 in Right hand (Mean± SD)	97.42% (±1.353)
SpO2 in Left Foot (Mean± SD)	97.58% (±1.444)
Absolute difference In SpO2 between right Hand & Left Foot (Mean± SD)	1.07% (± 0.858)
PI in Right hand (Mean± SD)	2.426 (±1.477)
PI in Left Foot (Mean± SD)	2.433 (±1.321)
No. of Critical CHD diagnosed antenatally	2 (p= 0.000)*
No.of babies with Dysmorphism	4 (Down syndrome-1, Preauricular tag- 3)
No. of babies with Murmur during screening	3 (Critical CHD- 1, VSD- 2) (p= 0.000)*
No. of Screen Positive cases	6 (Low SpO2 & Low PI- 1, Low SpO2 & murmur- 1, Low SpO2- 2, Murmur- 2)

*P <0.05 is statistically significant

The pulse oximeter saturations (SpO2) and perfusion index (PI) were recorded in right hand and left foot in all the 1,011 babies screened. Mean SpO2 in the right hand and left foot was 97.32% and 97.57% respectively.

Figure 7: DISTRIBUTION OF SpO2 IN RIGHT HAND AMONG CASES

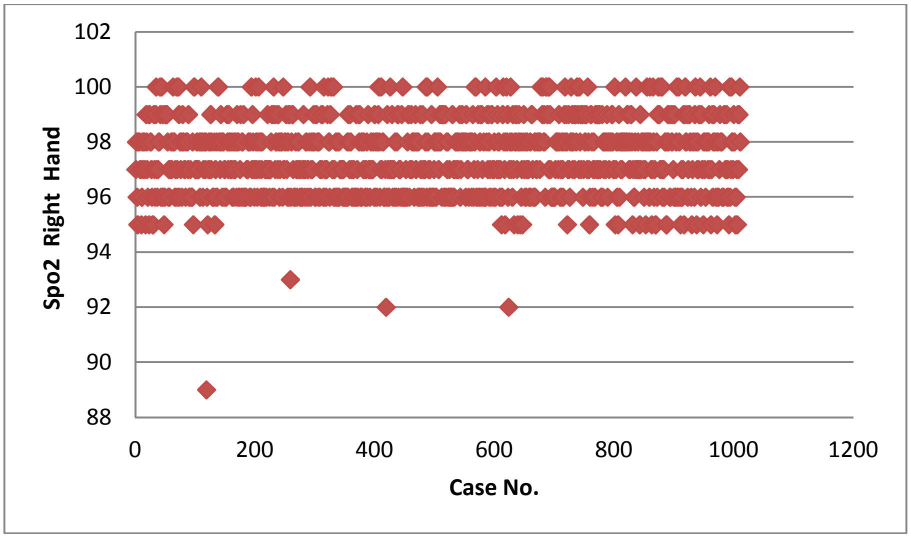
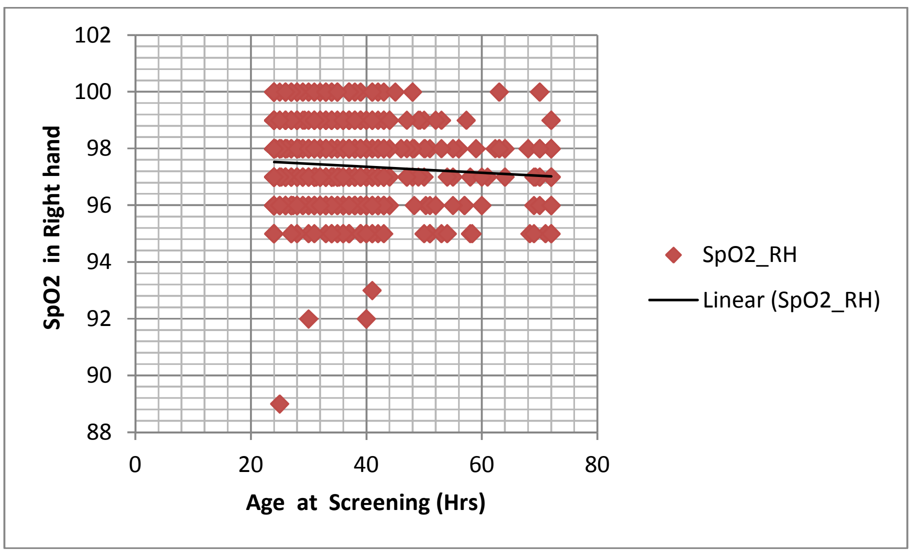


Figure 8: RELATIONSHIP BETWEEN AGE AT SCREENING & SpO2 IN RIGHT HAND



The interesting observation is that the right hand mean SpO2 is lower than the left foot mean SpO2 and it tend become slightly lower on day 3 of life.

Figure 9: DISTRIBUTION OF SpO2 IN LEFT FOOT AMONG CASES

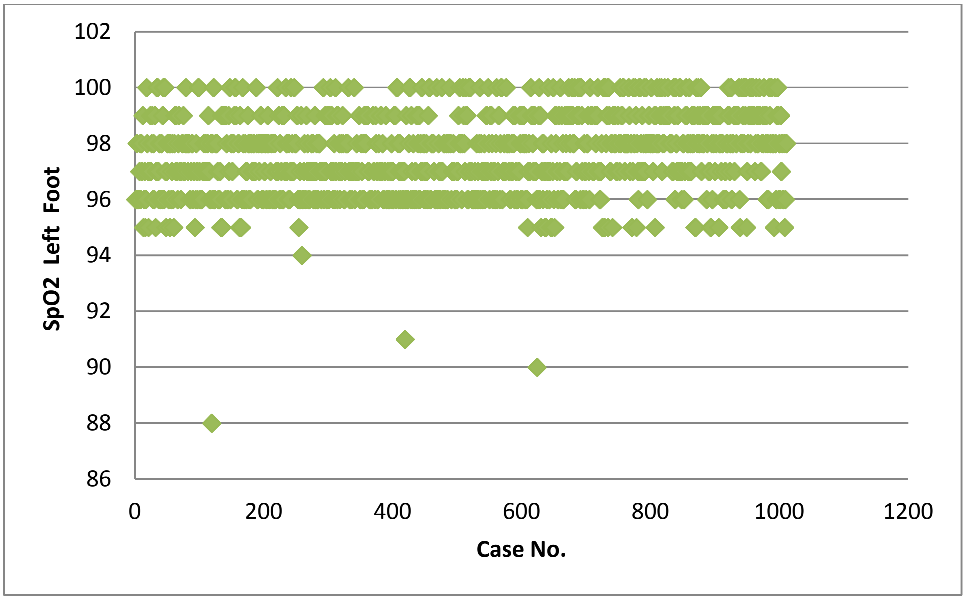
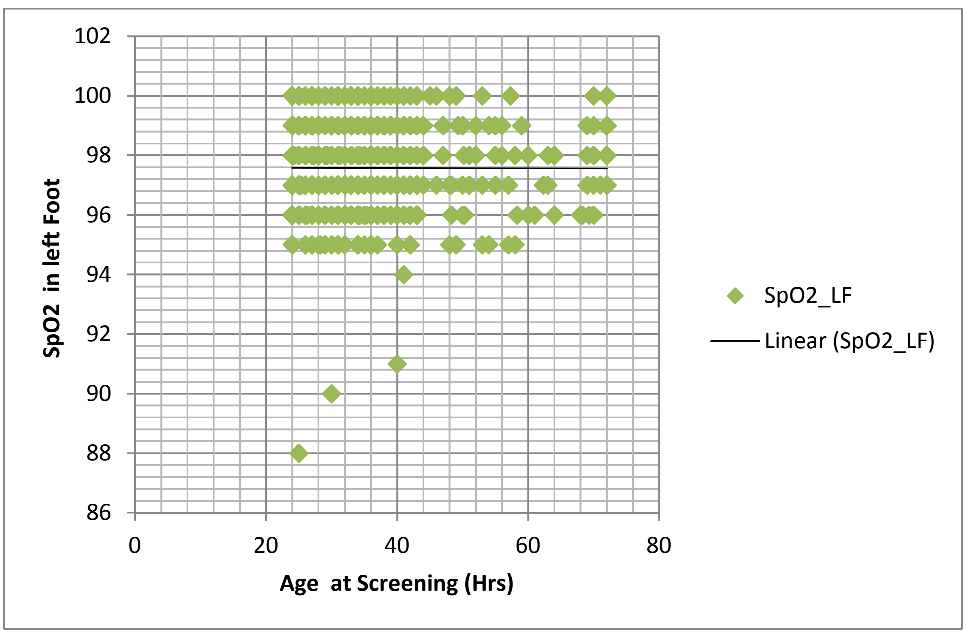


Figure 10: RELATIONSHIP BETWEEN AGE AT SCREENING & SpO2 IN LEFT FOOT



Mean absolute difference in SpO2 between two limbs was 1%.

Figure 11: <u>DISTRIBUTION OF ABSOLUTE DIFFERENCE IN SpO2 BETWEEN RIGHT HAND & LEFT FOOT</u>

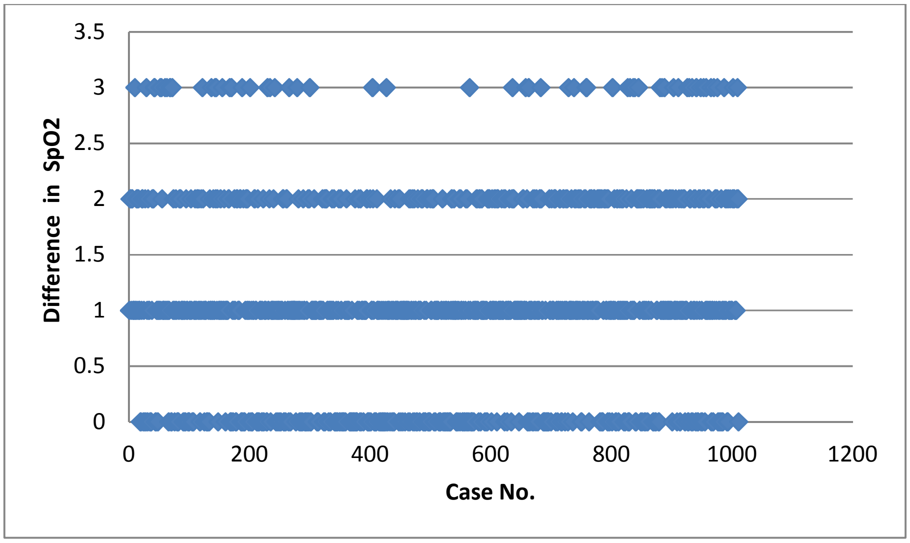
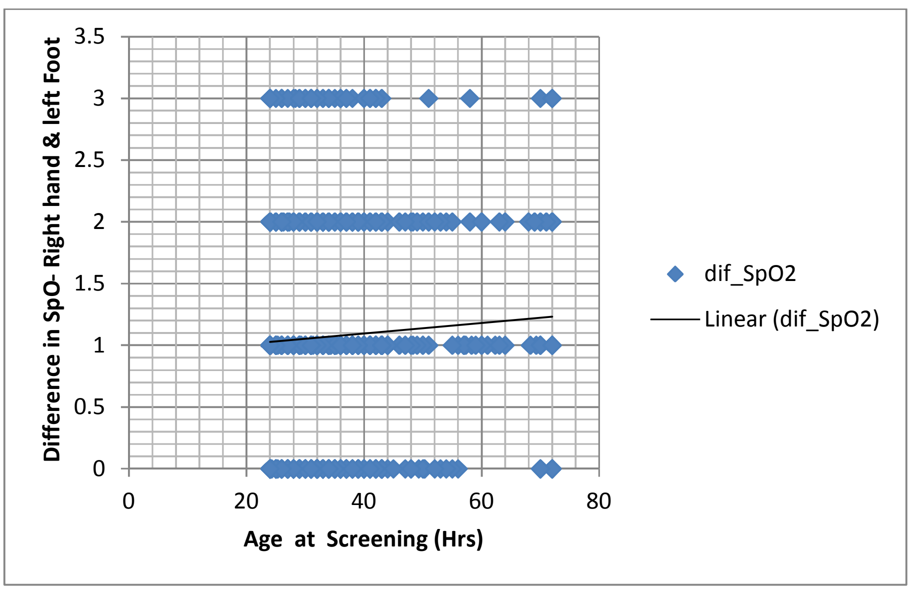


Figure 12: <u>RELATIONSHIP BETWEEN AGE AT SCREENING AND ABSOLUTE DIFFERENCE IN SpO2 BETWEEN RIGHT HAND & LEFT FOOT</u>



Mean PI in right hand and left foot was 2.4 and 2.6 respectively.

Figure 13: DISTRIBUTION OF PI IN RIGHT HAND AMONG CASES

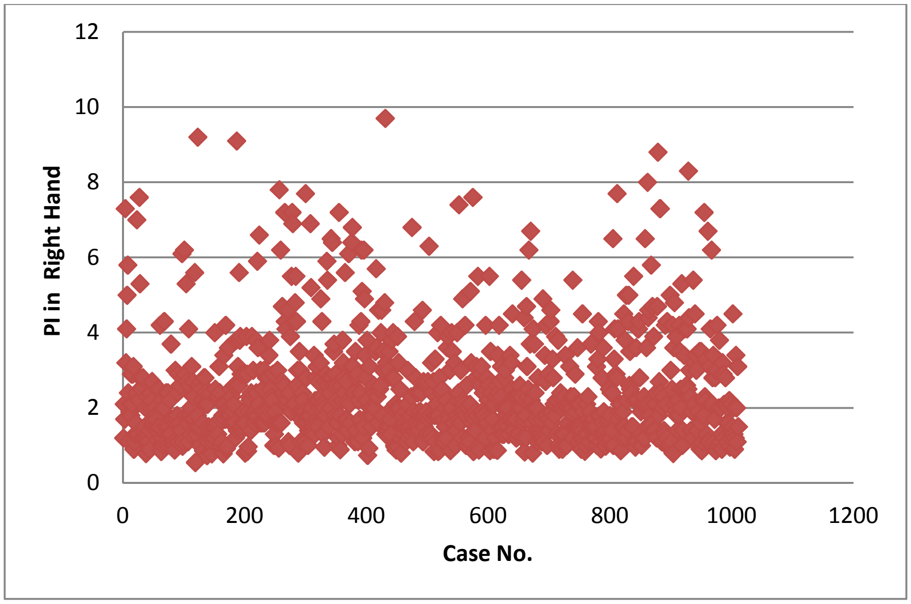
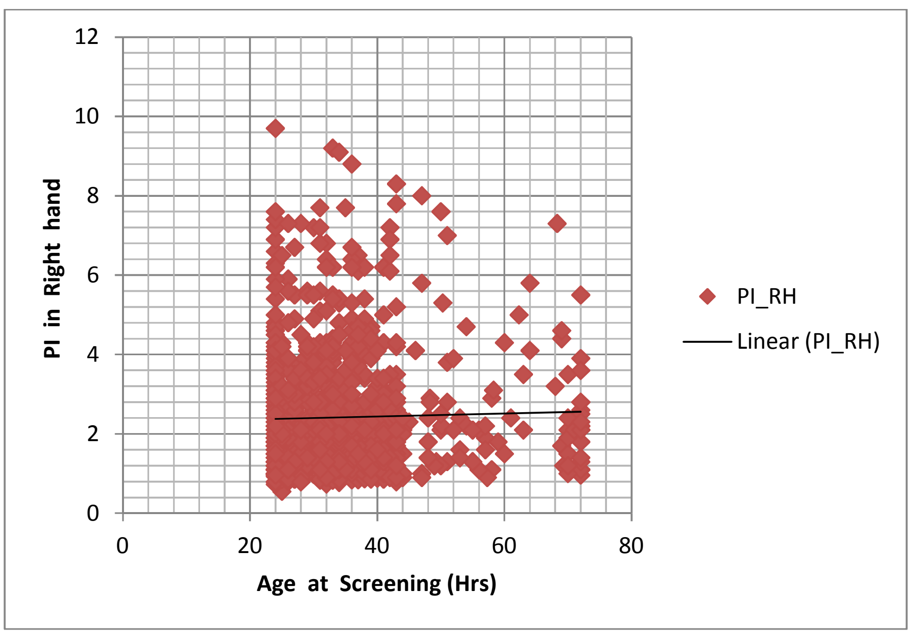


Figure 14: RELATIONSHIP BETWEEN AGE AT SCREENING AND PI IN RIGHT HAND



PI of both upper and lower extremities tend to increase as the age advances during screening period.

Figure 15: <u>DISTRIBUTION OF PI IN LEFT FOOT AMONG CASES</u>

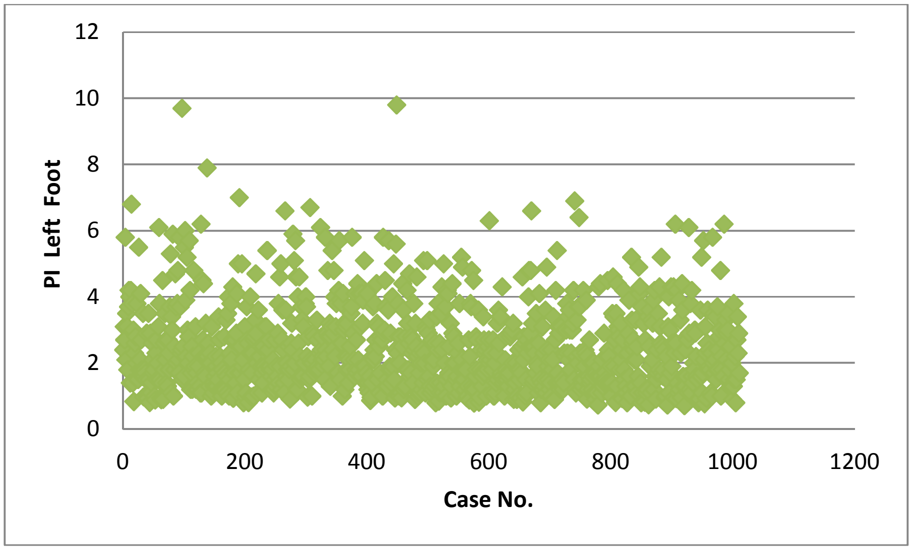
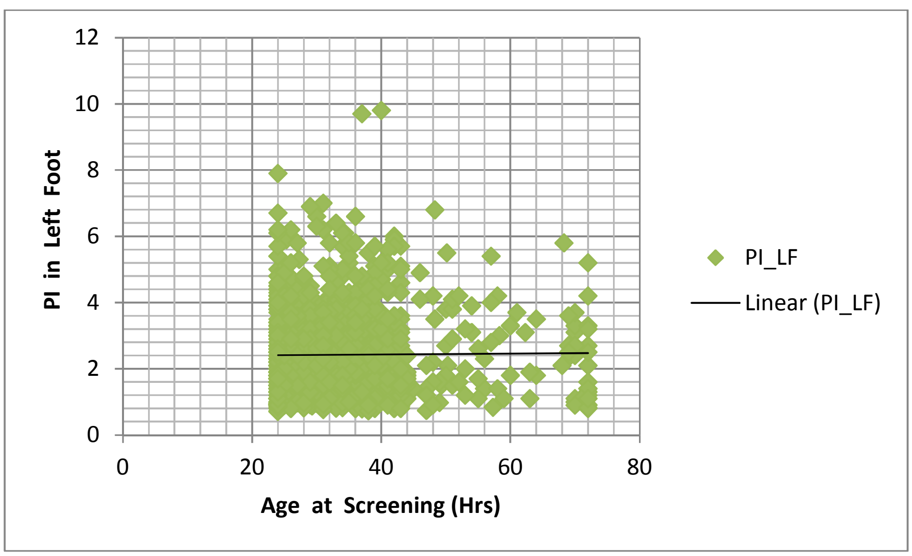


Figure 16: <u>RELATIONSHIP BETWEEN AGE AT SCREENING AND PI IN LEFT FOOT</u>



One baby (Case No. 1) had SpO2 <90 % in the first screening and also had PI< 0.7 in right hand. This baby was antenatally diagnosed to have single ventricle. At the end of first screening 53 babies had SpO2 of 90- 94%, 2 babies had a systolic murmur and one baby had systolic murmur with SpO2 of 90- 94%. These 56 babies underwent second screening after 1 hour. Of them 49 babies became screen negative, 4 babies had SpO2 of 90- 94%, two babies had systolic murmur and one baby had systolic murmur with SpO2 of 90- 94%. Third time screening was done in these 6 babies after one hour. Two babies persistently had SpO2 of 90- 94%, two babies had systolic murmur and one baby had systolic murmur with SpO2 of 90- 94%. These five babies were also declared screen positive.

Thus we had six screen positive cases- one at first screening and others at end of third screening. All the six babies were sent for pediatric cardiologist opinion and echocardiographic examination. Three babies had the following critical CHDs:

Case No. 1 (Serial No. 119 in master chart) : TGV, IAA, Single Ventricle, Hypoplastic left AV valve, PDA (Critical CHD) - This baby was antenally diagnosed to have a single ventricle, had SpO2 <90% in the first screening and also had low PI in right hand.

Case No. 2 (Serial no. 419 in master chart) : Right Ventricle dysplasia with severe RV outlet obstruction (Critical CHD) - This baby had SpO2 persistently in 90- 94% range in all three screening examinations.

Case No. 3 (Serial No. 624 in master chart) : Tetralogy of Fallot with large subaortic VSD, 50% over riding of aorta with severe Right Ventricle outlet obstruction (Critical CHD) - This baby was diagnosed antenatally as Tetralogy of Fallot, had SpO2 persistently in 90- 94% range in all three screening examinations and also had a systolic murmur by clinical examination.

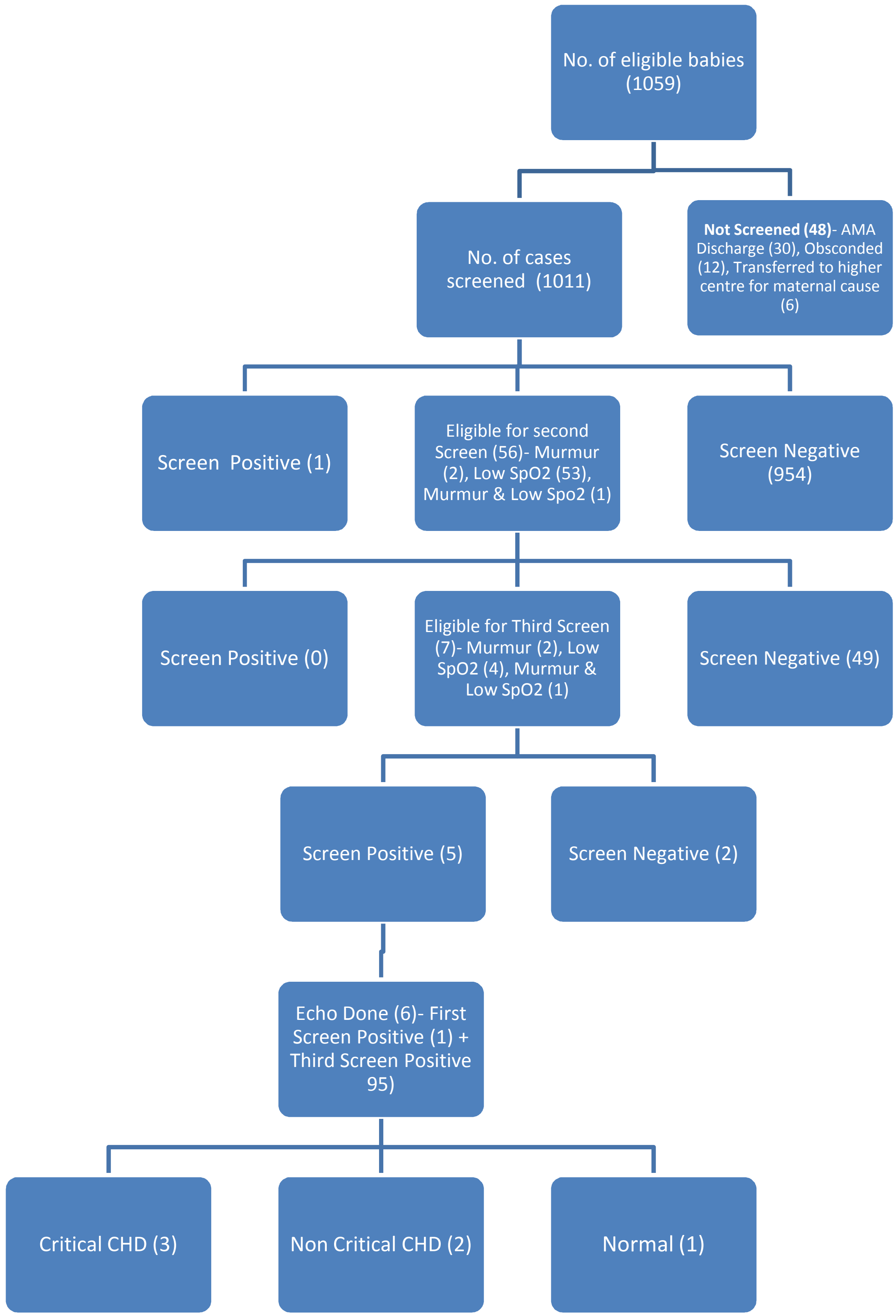
Case No. 4 (Serial No. 766 in master chart) : Moderate sized VSD with Left to Right shunt, Patent Foramen Ovale (PFO) with Left to Right shunt and moderate Pulmonary hypertension. (Non Critical CHD) This baby had a systolic murmur at left lower sternal border.

Case N0. 5 (Serial no. 900 in master chart): VSD with left to right shunt and PFO with left to right shunt (Non Critical CHD). This baby had a systolic murmur at left lower sternal border.

The sixth baby (Serial No. 259 in master chart) had a patent foramen ovale and otherwise normal heart. This baby had its screen at 41 hours of life and the SpO2 raised above 95% after 60 hours of life. The babies identified to have CCHD were referred to Pediatric Cardiothoracic surgery department at Institute of Child Health, Egmore, Chennai for further evaluation and management.

Cases were followed up at 6 weeks of age, when they attended the well baby clinic for review and first dose of DPT/OPV/Hep B vaccination. A total 856 babies were reviewed in the follow up OP and none clinical features of CHD. 148 babies who didn't turn for follow up were contacted through phone and were reported to be healthy without any symptoms suggestive of CHD.Thus the incidence of Critical CHd in our population was 2.97 per 1000 babies and the incidence of CHD was 5.94 per 1000 babies.

Figure 17: <u>CHART SHOWING THE FLOW OF INFANTS THOUGH THE STUDY</u>



The statistical analysis of the diagnostic value of SpO2 <95% in diagnosing CCHD revealed a sensitivity of 100% (95% CI: 43.85, 100), specificity of 99.9% (95% CI: 99.44, 99.98) and positive predictive value(PPV) of 75% (95% CI: 30.06, 95.44) with false positivity rate of 25%. The PI < 0.7 in identifying CCHD has a sensitivity of 33.33% (95% CI: 6.149, 79.23), specificity of 100% (95% CI: 99.62, 100) and PPV of 100% (95% CI: 20.65, 100). If we consider the role of PI only in identifying Left heart obstructive lesions then the sensitivity in 100% and specificity is 100% as we had only one case with interrupted aortic arch which identified by low PI. The clinical examination alone has a sensitivity of 33.33% (95% CI: 6.149, 79.23), specificity of 99.8% (95% CI: 99.28, 99.95) and PPV of 33.33% (95% CI: 6.149, 79.23) with false positivity rate of 66.67% in identifying CCHD. When all three methods of screening are combined i.e., SpO2, PI & clinical examination the sensitivity is 100% (95% CI: 43.85, 100), specificity is 99.7% (95% CI: 99.13, 99.9) and PPV is 50% (95% CI: 18.76, 81.24) with false positivity rate of 50% in identifying Critical CHD.

Table 3: <u>EVALUATION OF THE SCREENING TEST</u>

Variables	Sensitivity (95% CI)	Specificity (95% CI)	Positive Predictive Value (95% CI)	Negative Predictive Value (95% CI)	Diagnostic Accuracy (95% CI)
SpO2- Right Hand	100% (43.85, 100)	99.9% (99.44, 99.98)	75% (30.06, 95.44)	100% (99.62, 100)	99.9% (99.44, 99.98)
SpO2- Left Foot	100% (43.85, 100)	99.9% (99.44, 99.98)	75% (30.06, 95.44)	100% (99.62, 100)	99.9% (99.44, 99.98)
SpO2- both limbs	100% (43.85, 100)	99.9% (99.44, 99.98)	75% (30.06, 95.44)	100% (99.62, 100)	99.9% (99.44, 99.98)
PI- Right Hand	33.33%(6.149, 79.23)	100% (99.62, 100)	100% (20.65, 100)	99.8% (99.28, 99.95)	99.8% (99.28, 99.95)
PI- Both limbs	33.33%(6.149, 79.23)	100% (99.62, 100)	100% (20.65, 100)	99.8% (99.28, 99.95)	99.8% (99.28, 99.95)
Clinical Exam	33.33%(6.149, 79.23)	99.8% (99.28, 99.95)	33.33% (6.149, 79.23)	99.8% (99.28, 99.95)	99.6% (98.99, 99.85)
SpO2 & PI- Right hand	100% (43.85, 100)	99.9% (99.44, 99.98)	75% (30.06, 95.44)	100% (99.62, 100)	99.9% (99.44, 99.98)
SpO2 & PI- Left Foot	100% (43.85, 100)	99.9% (99.44, 99.98)	75% (30.06, 95.44)	100% (99.62, 100)	99.9% (99.44, 99.98)

SpO2 & Clinical Exam	100% (43.85, 100)	99.7% (99.13, 99.9)	50% (18.76, 81.24)	100% (99.62,100)	99.7% (99.13, 99.9)
PI- Right Hand & Clinical Exam	66.67% (20.77, 93.85)	99.8% (99.28, 99.95)	50% (15, 85)	99.9% (99.44, 99.98)	99.7% (99.3, 99.9)
PI- Left Foot & Clinical Exam	33.33% (6.149, 79.23)	99.8% (99.28, 99.95)	33.33% (6.149, 79.23)	99.8% (99.28, 99.95)	99.6% (98.99, 99.85)
SpO2, PI & Clinical Exam	100% (43.85, 100)	99.7% (99.13, 99.9)	50% (18.76, 81.24)	100% (99.62, 100)	99.7% (99.13, 99.9)

DISCUSSION

Pulse oximetry can detect mild hypoxemia, which is characteristic for many forms of CCHD, and may not be recognised by clinical examination . The first abstracts examining pulse oximetry as a screening tool for CCHD were published in 1995. Since then, there has been an increasing number of single and oligocentric studies on the subject. There are many differences among the study protocols concerning target lesions, time of screening, cut-off values, probe placement[2] and and different oximeters measuring either functional or fractional saturation.[18]

STUDY POPULATION

Studies differ in their criteria for inclusion and exclusion of cases, though majority of the studies were carried out in inborn units including only the asymptomatic babies in well baby nurseries or in the postnatal wards with their mothers. Some studies have used the gestational age as an additional criteria for inclusion: Arlettas et al- >35 wks, Reide et al- ≥37 wks and Ewer et al- >34 wks.[20,2,21] Sendelbach et al have used both gestational age ≥ 35 weeks and birth weight ≥ 2100 gm as a criteria for inclusion in the study.[22] Vaidyanathan et al have included both term and preterm babies.[23] Arlettas et al have included the antenatally diagnosed CHD in their study population and have commented that inclusion of CHD detected prenatally is not a limitation, but is certainly a confounding factor in their study.[20] Richmond et al have also included four babies whose antenatal scan had showed a severe cardiac malformation. These four had postductal saturation measured in the same way as the routine measurements to find out if they would have been picked up had the antenatal diagnosis not been made. Their diagnoses were simple

Table 4: COMPARISON OF VARIOUS STUDIES ON PULSE OXIMETER SCREENING FOR CONGENITAL HEART DISEASES															
No.	**Author & Journal**	**Study Type**	**Population**	**Exclusion**	**SpO2 Cut Off**	**Age**	**Pre/Post Ductal**	**Pulse oximeter**	**Gold Standard**	**Screening**	**CHD nature**	**POx:Sn;Sp; PPV;NPV**	**ClEx:Sn;Sp; PPV;NPV;LLR**	**Echo**	**Follow Up**
1.	Arlettas; Switzerland; Eur J Ped 2005[20]	Prospective, Multi centre	>35 wks; Prenatal cases included	Resp. disorder	<95%/ <90%	6- 12 hrs	Post(Rt. Or Lt. foot)	Nellcor NPB-40; Funct.	Clinical exam	Pox; Clinical Exam if <95%	All CHDs	100;99.7; 63;100			9 months-Method unspecified
2.	Granelli; Sweden; BMJ 2008[18]	Cohort, Multi centre	Well baby nursery	Admitted to NICU, AN diagnosed cases	Both< 95%/ Diff. >3%/ ≤90%	Prior to discharge (median-38hrs)	Pre(Rt. Hand) & Post(Foot)	Radical SET-4, Masimo	-	Pox; ClEx blinded to Spo2	Duct dependant circulation	62.07;99.82; 20.69;99.97;LLR-34.88; RR-719.8(350.3-1479)	62.5;98.07; 1.35;99.98; RR-83.6; LLR-32.4	Only for abnormal screen	1yr-national database of forensic medicine
3.	Koppel;New York,USA Pediatrics 2003[25]	Prospective	Asymtomatic newborns in Well infant nursery	Clinical signs present; Fetal diagnosis	≤95%	>24 hrs	Postductal Spo2	Not specified	-	Clinical exam-Normal; Then POx;	Critical CHD	60;99.95;75; 99.98; accuracy-99.97	-	Only for abnormal screen	Congenital malform. Registry - Till 2 yrs
4.	Richmond; UK; ADC F&N-2002[24]	Prospective	All asym-ptomatic inborn babies; included babies detected antenata-lly	Admitted to NICU	<95%	After 2 hrs but before discharge	Postductal-foot	Radiometer-Oxi machine; Fractional		POx; Clinical exam by midwife if POx-Abn	All CHD	53;99;-;-	-	Only for Abn screen	1 yr-Database

5.	Reide;Germany; Eur J Ped 2010[2]	Prospective, Multicentre	Healthy Term & post term newborns (≥37wks)	Prenatal diagnosis, Clinical signs of cCHD	≤95%	24- 72 hrs	Postductal- Foot	No specific model, Functional		POx, ClEx if abn POx	Critical CHD	77.78;99.90; 25.93; 99.99		Only for Abn screen	
6.	Sendelbach; Texas,USA Pediatrics 2008[22]	Prospective	Stable inborn, ≥35 wks & ≥2100 gm	Major malform., Transferred to higher level of care	<96%	4 hrs	Postductal- Foot; Probes held manually without Velcro tapes	Nellcor - N 395		POx; ClEx- blinded to POx result	Critical CHD	75;94;-;-		Only for Abn screen	No follow up
7.	Vaidyanathan; Kerala,India; IP 2011[23]	Prospective longitudinal	All babies, including preterms	Outborn babies	<94%	At 48 hrs	Post ductal- Lower extremity	Oximax -N 65, Nellcor Purittan Bennatt	Echo	POx; Clinical exam within 48 hrs;	All major & minor CHDs	Major CHD: 13.3;90.7;0.3;99.7 All CHDs: 11.4;90.9;9.4;92.8	Major CHD: 13.3;96.9;1.1;99.7 All CHD:9.26;97.4;23.3;92.8	Bedside Echo for all babies; Expert echo for abnormal screen	At 6 weeks by clinical exam, exam, Questionnerre or telephone

8.	This study	Prospective Longitudinal	All Asymptomatic newborns; including antenatally detected babies	Asymptomatic babies under evaluation for sepsis	<95%	24- 72 hrs	Pre ductal (Right hand) & Post Ductal (Left foot)	Masimo Radical 7 pulse co oximeter with Signal extraction technology	Echo	POx & Clinical exam 24- 72 hrs	Critical CHD	100; 99.9; 75; 100	33.33; 99.8; 33.33; 99.8	Only for Abn. screen	At 6 weeks by clinical exam, telephone or postal mail

transposition, complex transposition, complex pulmonary atresia, and coarctation of the aorta with VSD. In all four the "routine" saturation measurement was less than 95%, thus indicating that had the antenatal diagnosis not been made in these four cases, then a saturation measurement would have triggered investigation.[24]

In our study also we have included the antenatally diagnosed cases, with the aim to find out whether these cases would have been picked by pulse oximetry screening had the antenatal diagnosis not made. We had two antenatally diagnosed cases confirmed by postnatal echo as Case No. 1: Single ventricle with TGA & Interrupted Aortic arch and Case No. 3: TOF with severe RV outlet obstruction. Case No. 3: had SpO2 persistently in 90- 94% range in all three screening. Case No. 1 had a SpO2 <90% at first screening and Interestingly, also had low PI in right hand indicating the presence of obstruction to systemic circulation. Thus indicating that even if it had been an isolated Interrupted Aortic arch, this case would have been picked up by pulse oximeter when both SpO2 and PI are recorded for all babies. This highlights the significance of including the PI in the screening protocol for CCHDs.

Koppel et al have excluded the antenatally detected cases. Their study included two centres, of them one had facility for fetal echo and 9 out of 14 cases (65%) of CCHD were diagnosed antenatally in this centre. This suggest that in a center where fetal echocardiography is readily accessible, many lesions will be diagnosed prenatally and therefore will not require screening for detection. This phenomenon has the effect of decreasing the prevalence of CCHD in the population of asymptomatic infants undergoing oximetric screening. Centers where fetal echocardiography is performed less frequently are likely to demonstrate higher yields from oximetric screening. They conclude that the prenatally diagnosed lesions in their series, with the possible exception of the case of coarctation, would have been amenable to oximetric detection.[25]

Reide et al had a relatively high percentage of CCHD detected by prenatal ultrasound (60%) in their study. They have excluded these babies from their study because when a prenatal diagnosis of CCHD is made, after delivery, these newborns receive immediate medical assessment and treatment if the diagnosis is confirmed. SpO2 is an important target in the postnatal management of CCHD. It is kept within the normal range in non-cyanotic lesions, whereas in many cyanotic lesions, an attempt is made to maintain pulmonary to systemic flow ratio at 1:1 (corresponding to an SpO2 of about 80%). Thus, SpO2 in these newborns rather reflects the underlying hemodynamics and the quality of postnatal care. It is difficult to answer the question whether these children would have been detected by Pulse oximetry screening (or by previous clinical observation/physical examination). This would only have been possible if the prenatal diagnosis and postnatal care had been withheld, which obviously was not feasible for ethical reasons.[2]

Other exclusion criteria mentioned are respiratory disorder[20], admission to NICU[18, 24], presence of major congenital malformation[22] , transfer to higher level of care[22] and outborn babies.[23]

SCREENING METHODS

Studies also differ widely in their time of screening and the site of recording SpO2. Authors differ greatly in the time they have chosen for screening. Few have screened the babies within 24 hrs[20, 22, 26], some have screened beyond 24 hrs of life[2, 23, 25], whereas few others have screened prior to discharge irrespective of hours of life.[18, 21, 24, 27] AAP states that Screening should not be undertaken until 24 hours of life or as late as possible if early discharge is planned to reduce the number of false positive results.[16] and we have adopted the strategy of screening the babies between 24 – 72 hrs of life.

Many studies have recorded only the postductal SpO2 in either foot.[2, 20, 24, 25, 22, 23] However Granelli et al, have measured both the preductal SpO2 in right hand and postductal Spo2 in foot and have included the absolute difference in SpO2 between the two limbs as one of the screen positive criteria. They state that although it looks simple to screen by measuring only postductal circulation, it overlooks the fact that in complex heart disease with a combination of transposed great vessels and an arch obstruction the postductal saturation may well be >95%in a child with duct dependent circulation. In practice, it takes less than a minute extra to measure oxygen saturation in both hand and foot instead of foot only, and it does provide useful additional information. As patients with duct dependent systemic circulation are the ones most likely to develop early circulatory collapse with neurological and other morbidity, the authors opined that a >3% difference between preductal and postductal saturation substantially increases the likelihood of a duct dependent systemic circulation being present. They conclude that the addition of the >3% difference as a criterion did not increase the false positive rate in normal babies but did detect a few more cases with pathology.[18]

In our study we included the measurement of both preductal and postductal Spo2. We couldn't identify any case with significant absolute difference in SpO2 between right hand and left foot though we had one baby with TGA and Aortic arch obstruction. Probably this may be due to the complex nature of the defect with single ventricle physiology which resulted in SpO2 < 90% in both preductal and postductal areas. However there was a difference in PI, with low PI in right hand and normal PI in left foot probably due to a difference in perfusion of preductal and postductal regions caused by aortic arch obstruction. This signifies the need to measure both the preductal and postductal SpO2 and PI values for screening CCHDs. AAP recommendation which is endorsed by the Secretary of Health and Human Services, USA states that Oxygen saturations should be obtained in the right hand and one foot.

Authors also differ in the SpO2 cut off used to define screen positives. Some have used a cut off of ≤ 95%[25,2,22] while others have used a value of <95%.[18,20,24,26,27] Vaidyanathan et al have used a cut off of <94%.[23] AAP recommends using cut off value of <95% SpO2 in either limb or >3% absolute difference in SpO2 between upper and lower extremity to identify screen positives[16] and we have adopted the same values in our screening.

All authors have included the clinical examination in their study protocol. However in some studies clinical examination was done only if the SpO2 values were low[2,20,24] whereas Koppel et al have done pulse oximetry only if clinical examination was normal.[25] Granelli et al and Sendelbach et al have binded the Clinical examination results and the pulse oximeter readings in their study.[18,22] In our study clinical examination and pulse oximeter recording were done for all babies though blinding was not attempted.

EQUIPMENT USED

Pulse oximeter equipment of various manufacturers were used in different studies. Some instruments measure the fractional SpO2 (Radiometer- Oxi machine)[24] whereas others displayed the functional SpO2 (Masimo Radical SET 4, Nellcor NPB 40).[18,20] Fractional oxygen saturation is about 2% less than functional saturation.[24] Thus the functional SpO2 is thought to be about 1.6–2% higher at saturation levels used as cut-offs in pulse oximetry screening. If this is not taken into consideration while screening, the actual cut-off might shift by 1–2%, thus potentially increasing the false-positive or false-negative rates.[28] However, the exact algorithms used for the calculation of fractional SpO2 are more complex otherwise all fractional pulse oximeters would display a maximum of 98%, which is not the case.[28]

Other technical differences between the various types of oximeter include signal averaging times and methods for excluding movement artefacts. These are dependent on product developments aiming to minimise bias, which probably makes them less noteworthy. Adequate, up-to-date comparisons of the continually changing selection of oximeter brands, models and software upgrades on the market are not usually available. Despite the variations described above, the results of pulse oximetry screening seem rather consistent at cut-off levels of about 94–96%, allowing for minor technical differences.[28]

GOLD STANDARD FOR CONFIRMATION

Ideally in evaluation of diagnostic test, the test results have to be compared with the gold standard in every case. Such a confirmation will require doing echo for all cases studied to evaluate the diagnostic accuracy of Pulse oximeter screening.

This is practically not feasible in large community studies and will require enormous man power, technical expertise and financial support. Hence in majority of studies authors have done echo only for screen positive cases and just followed up the screen negative cases for manifestations of CCHD. However in Vaidyanathan et al study, screening echo was done by trained pediatrician for all study cases and any abnormal echo was later confirmed by pediatric cardiologist.[23] They had a sensitivity Of 20% for major CHD and specificity 88% for combined clinical evaluation and pulse oximetry.[23]

DIAGNOSTIC TEST EVALUATION

Thangarathinam et al on the basis of the eight studies, have found the summary estimates of sensitivity and specificity were 63% (95% CI 39% to 83%) and 99.8% (95% CI 99% to 100%), respectively, yielding a false positive rate of 0.2% (95% CI 0% to 1%).[1] Valmari et al based on ten studies (44 969 newborns, 71 severe defects) found a high specificity (99.9–99.99%), and the overall rate of detection of 15 individual defects with Pulse Oximetry was 72% (range 46–100%), exceeding that of the clinical examination 58% (9–86%). Similar results were obtained for cyanotic CHD (89% vs 69%, respectively). Without pulse oximetry, discharge of apparently healthy infants with unknown CHD was 5.5 times and 4.1 times more likely in cyanotic CHD and all serious CHD, respectively.[28] In our study, we have found out that the diagnostic value of SpO_2 <95% in diagnosing CCHD has a sensitivity of 100% (95% CI: 43.85, 100), specificity of 99.9% (95% CI: 99.44, 99.98) and positive predictive value(PPV) of 75% (95% CI: 30.06, 95.44) with false positivity rate of 25%.

DURATION OF FOLLOW UP

AAP defines CCHD as heart disease that require intervention or cause death within 1 year of life if left untreated.[5] So many studies have followed up their cases beyond one year of age. Some other authors have defined CCHD as heart diseases that require intervention or casuse death within 1 month of age.[4] We have adopted the second definition for our study.

ROLE OF PERFUSION INDEX

Granelli et al have found that the peripheral perfusion index was pathologically low (<0.70) in 5/9 infants with duct dependent obstruction of the left heart or aortic arch. Thus they have suggested that incorporating cut-off values for perfusion index into routine pulse oximetry screening would probably increase sensitivity for detection of left heart obstructive disease, but the implications for the false positive rate would have to be assessed.[18] In our study, the PI < 0.7 in identifying CCHD has a sensitivity of 33.33% (95% CI: 6.149, 79.23), specificity of 100% (95% CI: 99.62, 100) and PPV of 100% (95% CI: 20.65, 100). If we consider the role of PI only in identifying Left heart obstructive lesions then the sensitivity in 100% and specificity is 100% as we had only one case with interrupted aortic arch which identified by low PI.

MERITS & LIMITATION OF THE STUDY

In this study we have for the first time, to the best of our knowledge have attempted to study the role combined SpO2 and PI screening in identifying the Critical CHDs. Though the sample size was small, we have got encouraging results whereby PI has corectly identified one case with interrupted aortic arch. The study is severly limited by its small sample size and the inability to have clinical follow up for 15% of babies at 6 weeks.

SUGGESTIONS FOR FUTURE STUDIES

Study must be designed in a large scale involving a large sample size and incorporating both SpO2 and PI as screening modalities . A multicentric study will be an ideal option to have large sample size.

CONCLUSION

Several studies have proved the role of hemoglobin saturation measurement by pulse oximeter screening in identifying critical Congenital heart diseases. The challenge in identifying left side obstructive heart diseases can be tackled by including perfusion index measurement in the screening protocol. Thus the routine screening of all asymptomatic newborn babies at 24- 72 hours of life with pulse oximeter measurement of hemoglobin saturation and perfusion index may help in early identification of more number babies with critical congenital heart disease.

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ANNEXURE: 1

PROFORMA

Name: Sex: B /G Case No:

Address: Baby's IP No: Phone No.:

Date & Time of birth:

Date & Time of exam: Hours of life:

____

AN scan: Nil significant/……………………………………………………………………

Mode of delivery: LN/ LSCS/ AB/ Forc/ Vacc **Birth wt:**

Dysmorphism: Yes/ No Specify……………………………………………………………………………………….

Central cyanosis: Yes/ No **Respiratory distress:** Yes/ No

Location of apical impulse: Left/ Right **Femoral pulses- Bilateral:** Felt/ Feeble/ not felt

≥ Grade 3/6 murmur in precordium: Yes/ No

	Right hand	**Left foot**	**Difference in SpO2**
SpO2			
PI			

Echo findings:

Follow up at 6 weeks: Clinical exam/ Telephone

Features of CHD: Present/ Absent

Details of further evaluation, if done:

ANNEXURE: 2

INFORMATION SHEET

- We are conducting a study on the role of pulse oximetry and perfusion index in screening for critical congenital heart disease in asymptomatic newborn babies at 24-72 hrs of life
- The purpose of this study is to diagnose certain cases of critical congenital heart diseases easily with the help of pulse oximeter.
- We are selecting certain cases and if your baby is found eligible, we will use pulse oximeter to test your baby, which in any way do not affect your baby's treatment.
- The privacy of the patients in the research will be maintained throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.
- Taking part in this study is voluntary. You are free to decide whether to participate in this study or to withdraw at any time; your decision will not result in any loss of benefits to which you are otherwise entitled.
- The results of the special study may be intimated to you at the end of the study period or during the study if anything is found abnormal which may aid in the management or treatment.

Signature of investigator　　　　　　　　　　Signature of parent

Date:

ANNEXURE: 3

INFORMEDCONSENTFORM

Title of the study: To study the role of pulse oximetry and perfusion index in screening for critical congenital heart disease in asymptomatic newborn babies at 24-72 hrs of life

Name of the Participant: ____.

Name of the Principal Investigator: Dr.S.Ramesh

Name of the Institution: Madras Medical College, Chennai

I ______________________________have read the information in this form (or it has been read to me). I was free to ask any questions and they have been answered. I am over 18 years of age and, exercising my free power of choice, hereby give my consent to include my baby as a participant in the study entitled "**Role of pulse oximetry and perfusion index in screening for critical congenital heart disease in asymptomatic newborn babies at 24-72 hrs of life**".

1. I have read and understood this consent form and the information provided to me.
2. I have had the consent document explained to me.
3. I have been explained about the nature of the study.
4. I have been explained about my rights and responsibilities by the investigator.
5. I agree to cooperate with the investigator
6. I am aware of the fact that I can opt out of the study at any time without having to give any reason and this will not affect my baby's future treatment in this hospital.
7. I am also aware that the investigator may terminate my participation in the study at any time, for any reason, without my consent.
8. I hereby give permission to the investigators to release the information obtained from me as result of participation in this study to the sponsors, regulatory authorities, Govt. agencies, and IEC. I understand that they are publicly presented.
9. I have understand that my identity will be kept confidential if my data are publicly presented
10. I have had my questions answered to my satisfaction.

I am aware that if I have any question during this study, I should contact the investigator. By signing this consent form I attest that the information given in this document has been clearly explained to me and understood by me, I will be given a copy of this consent document.

Although your child could not give his or her assent, you agree to your child's participation in this study.

Name and Signature of / thumb impression of the participant's parent(s) (or legal representative)

Name ___________________________ Signature __________________ Date _________________

Name ___________________________ Signature __________________ Date _________________

Name and Signature of impartial witness (required for parents of participant child illiterate):

Name ___________________________ Signature __________________ Date _________________

Address and contact number of the impartial witness: ____________________________________

Name and Signature of the investigator or his representative obtaining consent :

Name ___________________________ Signature __________________ Date _________________

ANNEXURE: 4

PATIENT INFORMATION SHEET (TAMIL)

ஆராய்ச்சி தகவல் தாள்

ஆராய்ச்சியின் பெயர் : "ரோல் ஆப் பல்ஸ் ஆக்ஸிமெட்ரி அண்டு பெர்பூஷன் இன்டெக்ஸ் இன் ஸ்கிரீனிங் ஃபார் கிரிடிகல் கன்ஜெனிடல் ஹார்ட் டிசீஸ் இன் ஏசிம்ப்டமெடிக் நியூபார்ன் பேபிஸ்"

ஆராய்ச்சியாளரின் பெயர் : மரு. எஸ். ரமேஷ்
டிஎம் (நியோநெட்டாலஜி)
பட்ட மேற்படிப்பு மாணவர்

எழும்பூர், அரசினர் தாய் சேய் நல மருத்துவமனையில் மேற்கூறிய ஆராய்ச்சி நடைபெற்று வருகிறது. இம் மருத்துவமனையில் பிறக்கும் குழந்தைகளுக்கு, தீவிர பிறவி இருதய நோய் உள்ளதா என்பதை கண்டறிவதே இந்த ஆராய்ச்சியின் நோக்கமாகும்.

தீவிர இருதய குறைபாடுகளுடன் உள்ள பச்சிளங்குழந்தைகள், பிறந்த முதல் சில நாட்களுக்கு தொந்தரவுகள் ஏதுமின்றி இயல்பாக இருக்கும். ஆனால் சில நாட்கள் கழித்து, இருதயம் சரிவர பணிபுரிய முடியாதபோது, இக்குழந்தைகள் திடிரென்று உடல்நிலை மோசமாக வாய்ப்பு உள்ளது. இதனால் குழந்தை உயிரிழக்கவும் கூடும்.

குழந்தை பிறந்த இரண்டு அல்லது மூன்று நாட்களுக்குள், பல்ஸ் ஆக்ஸிமீட்டர் என்ற கருவியின் மூலம் குழந்தையை பரிசோதித்தால், இக்கொடிய இருதய நோய்களை முன் கூட்டியே கண்டறிய வாய்ப்பு உள்ளது. இதனால் குழந்தையின் இருதய வியாதிக்கான சிகிச்சையை முன்கூட்டியே அளித்து, குழந்தையை காப்பாற்றவும் வாய்ப்பு உள்ளது. இந்த ஆராய்ச்சி, மேற்கூறிய பரிசோதனை முறையின் குறைநிறைகளை கண்டறிவதற்காக மேற்கொள்ளப்படுகின்றது.

உங்கள் குழந்தையும் இந்த ஆராய்ச்சியில் பங்கேற்க நாங்கள் விரும்புகிறோம். இதில் பங்கேற்பதின் மூலமோ அல்லது பங்கேற்ப மறுப்பதினாலோ, தங்கள் குழந்தைக்கு அளிக்கப்பட்டு வரும் சிகிச்சையில் எந்த பாதிப்பும் ஏற்படாது என்று உறுதி கூறுகிறோம்.

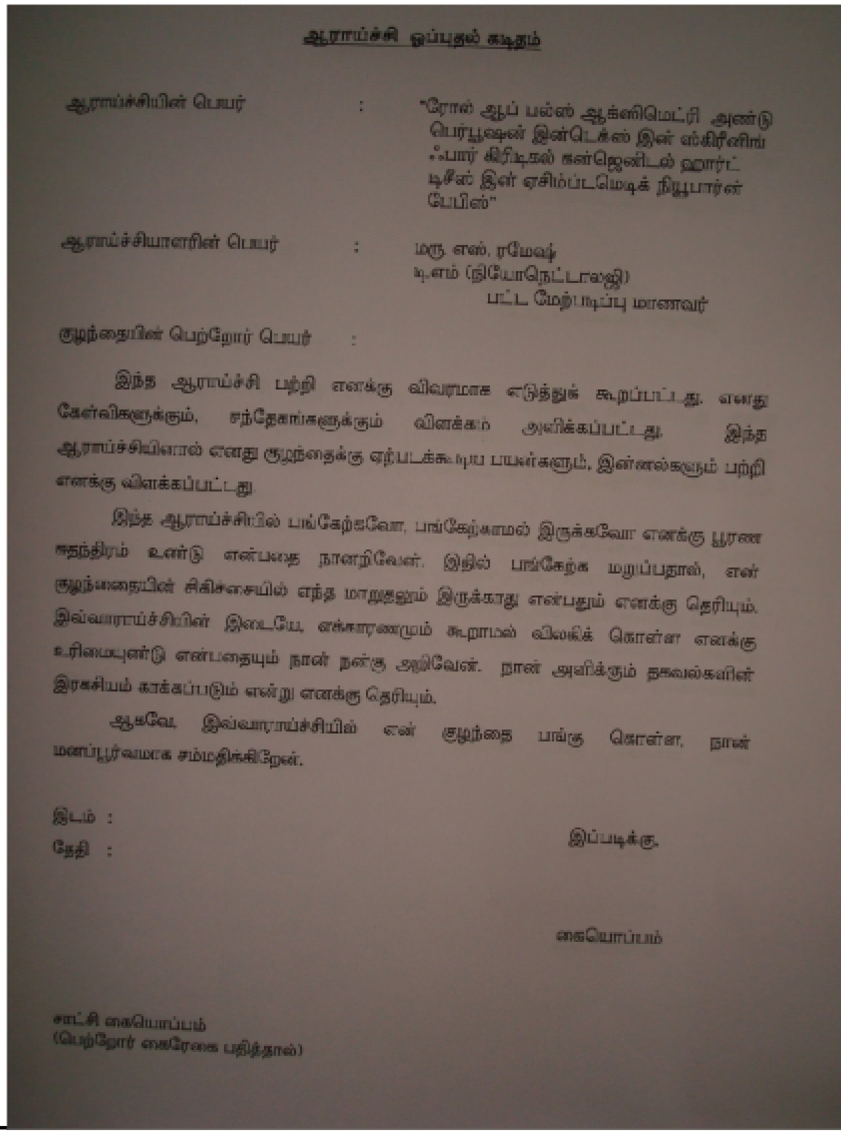
ஆராய்ச்சியின்போதோ, அதன் முடிவுகளை வெளியிடும்போதோ, தங்கள் குழந்தையின் பெயரையோ அல்லது அடையாளங்களையோ வெளியிட மாட்டோம் என்பதையும் தெரிவித்துக் கொள்கிறோம்.

இந்த ஆராய்ச்சியில் பங்கேற்பது தங்களுடைய விருப்பத்தின் பேரில் தான் இருக்கிறது. மேலும் நீங்கள் எந்நேரமும் இந்த ஆராய்ச்சியிலிருந்து பின்வாங்கலாம் என்பதையும் தெரிவித்துக் கொள்கிறோம்.

இந்த சிறப்பு பரிசோதனையின் முடிவுகளை ஆராய்ச்சியின் போதே தங்களுக்கு அறிவிப்போம் என்பதையும் தெரிவித்துக் கொள்கிறோம்.

ANNEXURE: 5

INFORMED CONSENT FORM (TAMIL)



ஆராய்ச்சி ஒப்புதல் கடிதம்

ஆராய்ச்சியின் பெயர் : "ரோல் ஆப் பல்ஸ் ஆக்ஸிமெட்ரி அண்டு பெர்பூஷன் இன்டெக்ஸ் இன் ஸ்கிரீனிங் ஃபார் கிரிடிகல் கன்ஜெனிடல் ஹார்ட் டிசீஸ் இன் ஏசிம்ப்டமெடிக் நியூபார்ன் பேபிஸ்"

ஆராய்ச்சியாளரின் பெயர் : மரு. எஸ். ரமேஷ்
டி.எம் (நியோநெட்டாலஜி)
பட்ட மேற்படிப்பு மாணவர்

குழந்தையின் பெற்றோர் பெயர் :

இந்த ஆராய்ச்சி பற்றி எனக்கு விவரமாக எடுத்துக் கூறப்பட்டது. எனது கேள்விகளுக்கும், சந்தேகங்களுக்கும் விளக்கம் அளிக்கப்பட்டது. இந்த ஆராய்ச்சியினால் எனது குழந்தைக்கு ஏற்படக்கூடிய பயன்களும், இன்னல்களும் பற்றி எனக்கு விளக்கப்பட்டது.

இந்த ஆராய்ச்சியில் பங்கேற்கவோ, பங்கேற்காமல் இருக்கவோ எனக்கு பூரண சுதந்திரம் உண்டு என்பதை நானறிவேன். இதில் பங்கேற்க மறுப்பதால், என் குழந்தையின் சிகிச்சையில் எந்த மாறுதலும் இருக்காது என்பதும் எனக்கு தெரியும். இவ்வாராய்ச்சியின் இடையே, எக்காரணமும் கூறாமல் விலகிக் கொள்ள எனக்கு உரிமையுண்டு என்பதையும் நான் நன்கு அறிவேன். நான் அளிக்கும் தகவல்களின் இரகசியம் காக்கப்படும் என்று எனக்கு தெரியும்.

ஆகவே, இவ்வாராய்ச்சியில் என் குழந்தை பங்கு கொள்ள, நான் மனப்பூர்வமாக சம்மதிக்கிறேன்.

இடம் :

தேதி : இப்படிக்கு,

கையொப்பம்

சாட்சி கையொப்பம்
(பெற்றோர் கைரேகை பதித்தால்)

ANNEXURE: 6

MASTER CHART

s. no					
baby IP no					
sex	Boy=1	Girl=2			
Hrs of life					
AN screening	Normal=1	signif=2			
Mode Of Delivery	LN=1	LSCS=2	AB=3	Forceps=4	Vaccum=5
bwt					
Dysmorphism	yes=1	No=2			
cyanosis	yes=1	No=2			
Resp Distress	yes=1	No=2			
Location of apical impulse	left=1	Right=2			
Femoral pulse	felt=1	feeble=2	not felt=3		
murmur	yes=1	No=2			
SpO2-RH					
SpO2-LF					
dif-SpO2					
PI-RH					
PI-LF					
Echo_find	1=Normal	2=Abnormal			
Follow UP	1=cli exam	2=Teleph			
Featuires of CHD	1=present	2=Absent			
Screen Positive	Yes= 1 (Positive)	No= 2 (Negative)			
Targeted Case	yes=1(Critical CHD)	No=2 (No CHD Or Non Critical CHD)			

S.No	Baby IP No	Sex	Age at screening (Hrs)	AN scan	Mode Of Delivery	Birth weight	Dysmorphism	Cyanosis	Respiratory Distress	Apical impulse	Femoral pulse	Precordial Murmur	SpO2- Right Hand	SpO2- Left Foot	SpO2 difference	PI- Right Hand	PI- Left Foot	Follow up	Features of CHD	Screen Positive	Targeted Case
1	28660	2	69.3	1	1	2.5	2	2	2	1	1	2	97	96	1	1.2	2.4	1	2	2	2
2	28490	2	70	1	2	3.1	2	2	2	1	1	2	98	96	2	2.1	3.1	1	2	2	2
3	28515	1	69	1	1	2.5	2	2	2	1	1	2	96	98	2	1.7	2.7	1	2	2	2
4	28666	1	68.3	1	1	2.6	1	2	2	1	1	2	95	96	1	7.3	5.8	1	2	2	2
5	28482	2	68	1	2	3.2	2	2	2	1	1	2	98	96	2	3.2	2.1	1	2	2	2
6	28312	1	64	1	1	2.75	2	2	2	1	1	2	98	96	2	4.1	3.5	2	2	2	2
7	28578	1	62.3	1	1	2.25	2	2	2	1	1	2	98	97	1	5	3.1	1	2	2	2
8	28385	1	64	1	1	2.4	2	2	2	1	1	2	97	98	1	5.8	1.8	1	2	2	2
9	28659	2	61	1	1	2.75	2	2	2	1	1	2	97	96	1	2.4	3.7	2	2	2	2
10	28369	1	58	1	1	3	2	2	2	1	1	2	95	98	3	1.1	4.2	1	2	2	2
11	28300	1	57	1	1	2.5	2	2	2	1	1	2	96	97	1	1.9	4	2	2	2	2
12	28688	2	56	1	1	2.4	2	2	2	1	1	2	98	99	1	2.1	1.4	1	2	2	2
13	28783	1	48	1	1	3	2	2	2	1	1	2	97	95	2	1.8	4.2	1	2	2	2
14	28720	1	48.3	1	1	2.5	2	2	2	1	1	2	98	96	2	2.9	6.8	2	2	2	2
15	28764	2	50	1	1	2.5	2	2	2	1	1	2	98	97	1	2.1	3.8	1	2	2	2
16	28800	1	58	1	2	2.5	2	2	2	1	1	2	97	95	2	2.9	1.4	1	2	2	2
17	28094	2	58.3	1	2	3.5	2	2	2	1	1	2	95	96	1	3.1	3	2	2	2	2
18	28811	1	57.3	1	2	2.6	2	2	2	1	1	2	99	100	1	0.9	0.84	1	2	2	2
19	28566	1	56	1	1	2.7	2	2	2	1	1	2	98	98	0	1.1	2.3	1	2	2	2
20	28769	2	55	1	1	3	2	2	2	1	1	2	97	97	0	1.3	2.6	1	2	2	2
21	28792	1	57	1	2	2.65	2	2	2	1	1	2	96	95	1	1.6	2.8	1	2	2	2
22	28665	2	53	1	1	2.8	2	2	2	1	1	2	99	97	2	2.4	2	2	2	2	2
23	28430	2	51	1	1	3.25	2	2	2	1	1	2	95	97	2	7	3.8	1	2	2	2
24	28768	1	49.3	1	1	2.6	2	2	2	1	1	2	99	99	0	1.3	1.5	1	2	2	2
25	28842	2	51	1	1	3.25	2	2	2	1	1	2	98	97	1	1.3	1.5	1	2	2	2
26	28568	1	50.15	1	2	2.75	2	2	2	1	1	2	98	98	0	2.2	5.5	2	2	2	2
27	28481	2	50	1	2	3.4	2	2	2	1	1	2	97	99	2	7.6	1.8	2	2	2	2
28	28269	2	50.3	1	2	3.1	2	2	2	1	1	2	96	96	0	5.3	2.1	1	2	2	2
29	28729	1	51	1	2	2	2	2	2	1	1	2	95	98	3	2.8	4.1	1	2	2	2
30	28793	2	50	1	2	3.45	2	2	2	1	1	2	95	96	1	2.5	2.7	1	2	2	2
31	28793	1	50	1	2	3	2	2	2	1	1	2	99	99	0	1.2	1.8	2	2	2	2
32	28349	1	49	1	2	3.8	2	2	2	1	1	2	97	95	2	1.2	1.6	2	2	2	2
33	27741	2	48.3	1	2	3	2	2	2	1	1	2	96	97	1	2.8	3.5	1	2	2	2
34	27966	1	49	1	2	2.6	2	2	2	1	1	2	99	100	1	1.2	0.98	1	2	2	2
35	28836	2	48	1	2	2.1	2	2	2	1	1	2	100	100	0	1.4	1.6	2	2	2	2

36	28736	2	44	1	1	2.6	2	2	2	1	1	2	97	97	0	1.5	1.8	1	2	2	2
37	28799	1	43	1	1	3.1	2	2	2	1	1	2	96	96	0	2	1.7	2	2	2	2
38	28910	1	43	1	2	3	2	2	2	1	1	2	97	98	1	0.79	1.5	2	2	2	2
39	28797	1	39	1	2	3.7	2	2	2	1	1	2	98	96	2	1.2	2.9	1	2	2	2
40	28911	1	37	1	1	2.5	2	2	2	1	1	2	98	96	2	2.3	1	1	2	2	2
41	28947	2	42	1	2	2.5	2	2	2	1	1	2	100	98	2	1.3	0.93	1	2	2	2
42	28926	2	41	1	2	2.5	2	2	2	1	1	2	99	96	3	1.1	3.5	2	2	2	2
43	28865	1	41	1	2	3.5	2	2	2	1	1	2	96	99	3	1.4	1.5	2	2	2	2
44	28952	2	39	1	2	3.1	2	2	2	1	1	2	100	100	0	0.89	0.81	1	2	2	2
45	28940	1	36	1	2	2.8	2	2	2	1	1	2	96	96	0	2.4	2.9	1	2	2	2
46	28167	1	37	1	2	2.8	2	2	2	1	1	2	99	100	1	2	1.1	1	2	2	2
47	28488	1	31	1	2	3.4	2	2	2	1	1	2	96	97	1	2.2	1.4	2	2	2	2
48	28923	2	30	1	2	2.7	2	2	2	1	1	2	95	95	0	2.7	2.6	1	2	2	2
49	28980	1	28	1	2	3.5	2	2	2	1	1	2	96	97	1	1.7	2.1	2	2	2	2
50	28881	2	27	1	2	3.5	2	2	2	1	1	2	99	98	1	1.6	1.7	2	2	2	2
51	29036	2	26	1	2	2.5	2	2	2	1	1	2	99	98	1	1.5	1.8	1	2	2	2
52	29035	1	26	1	2	2.1	2	2	2	1	1	2	99	96	3	2	1	1	2	2	2
53	27711	1	29.3	1	2	3	2	2	2	1	1	2	99	98	1	1.8	0.88	1	2	2	2
54	27711	2	28.3	1	2	2.5	2	2	2	1	1	2	98	95	3	1.8	2.3	2	2	2	2
55	29054	2	25	1	2	3.25	2	2	2	1	1	2	96	98	2	1.7	2.7	1	2	2	2
56	28968	1	35.3	1	1	3.1	2	2	2	1	1	2	97	96	1	1.4	1.5	2	2	2	2
57	28930	1	36	1	1	2.1	2	2	2	1	1	2	96	97	1	1.5	2	1	2	2	2
58	28814	1	34.3	1	1	2.1	2	2	2	1	1	2	97	98	1	2.5	3.1	1	2	2	2
59	28951	2	34.3	1	1	2.6	2	2	2	1	1	2	97	96	1	2.5	6.1	1	2	2	2
60	28886	2	30	1	1	3	2	2	2	1	1	2	98	95	3	1.5	3.8	1	2	2	2
61	28953	2	31.3	1	1	3.75	2	2	2	1	1	2	97	98	1	4.2	1.5	1	2	2	2
62	29006	1	30	1	1	3.25	2	2	2	1	1	2	98	99	1	1	0.95	2	2	2	2
63	29020	1	26	1	1	2.6	2	2	2	1	1	2	100	97	3	0.84	0.89	2	2	2	2
64	28939	1	26	1	1	3.1	2	2	2	1	1	2	98	99	1	2.2	1.4	1	2	2	2
65	29061	2	26	1	1	2.8	2	2	2	1	1	2	98	97	1	1.2	4.5	1	2	2	2
66	28973	1	24	1	1	1.98	2	2	2	1	1	2	96	96	0	1	0.9	1	2	2	2
67	28972	2	36	1	1	3.45	2	2	2	1	1	2	97	98	1	2	1.8	1	2	2	2
68	29004	1	36	1	1	2.5	2	2	2	1	1	2	96	99	3	4.3	2.6	1	2	2	2
69	29083	2	34	1	2	2.5	2	2	2	1	1	2	100	97	3	1.5	3.5	2	2	2	2
70	29112	1	33	1	1	3	2	2	2	1	1	2	97	97	0	1.3	2.1	1	2	2	2
71	28894	2	32	1	1	2.2	2	2	2	1	1	2	96	96	0	2.4	2.7	2	2	2	2
72	28737	2	30	1	2	3.5	2	2	2	1	1	2	100	97	3	1.1	1.4	1	2	2	2
73	28744	2	28	1	1	2.5	2	2	2	1	1	2	99	98	1	1	1.3	1	2	2	2
74	29105	2	28	1	1	2.4	2	2	2	1	1	2	96	98	2	2.4	2.7	1	2	2	2
75	29119	2	27	1	2	3.4	2	2	2	1	1	2	98	99	1	1.5	2.3	1	2	2	2
76	29042	1	29	1	2	3.9	2	2	2	1	1	2	97	97	0	1.3	1.8	1	2	2	2

77	28743	2	28	1	2	2.5	2	2	2	1	1	2	98	97	1	2.2	3.7	1	2	2	2
78	28751	1	27.3	1	2	2.85	2	2	2	1	1	2	96	98	2	1.3	5.3	2	2	2	2
79	29102	2	24	1	2	2.6	2	2	2	1	1	2	99	100	1	3.7	1.1	1	2	2	2
80	29040	1	24	1	2	2.7	2	2	2	1	1	2	98	98	0	1.7	3.4	2	2	2	2
81	29100	1	24.3	1	2	2.25	2	2	2	1	1	2	98	98	0	1	3	1	2	2	2
82	29111	1	25.3	1	2	4	2	2	2	1	1	2	97	97	0	1.7	5.9	1	2	2	2
83	29135	1	24	1	2	3	2	2	2	1	1	2	97	98	1	1.1	1	1	2	2	2
84	28752	1	26	1	2	2.75	2	2	2	1	1	2	96	98	2	1	2.5	1	2	2	2
85	29181	1	25	1	2	2.7	2	2	2	1	1	2	98	96	2	0.88	1.8	1	2	2	2
86	29170	1	26.3	1	2	2.7	2	2	2	1	1	2	98	96	2	3	4.7	1	2	2	2
87	29097	2	25.3	1	2	2.75	2	2	2	1	1	2	98	97	1	1.6	3.7	1	2	2	2
88	29132	1	24	1	2	2.5	2	2	2	1	1	2	97	98	1	1.7	2	2	2	2	2
89	27465	1	24	1	1	2.25	2	2	2	1	1	2	99	98	1	1.8	3.8	1	2	2	2
90	29056	1	24	1	2	3.25	2	2	2	1	1	2	96	96	0	2.4	4.8	1	2	2	2
91	29149	1	24	1	2	3.75	2	2	2	1	1	2	96	97	1	2.9	2.1	2	2	2	2
92	29176	2	43	1	1	2.7	2	2	2	1	1	2	97	97	0	1.1	1.7	2	2	2	2
93	29225	2	42	1	2	3	2	2	2	1	1	2	96	95	1	1.6	5.8	1	2	2	2
94	29145	2	40	1	4	3.5	2	2	2	1	1	2	96	96	0	2.6	3.7	1	2	2	2
95	29240	1	38	1	1	3	2	2	2	1	1	2	96	98	2	1.4	2.3	1	2	2	2
96	29210	1	38	1	1	2.75	2	2	2	1	1	2	98	97	1	1.4	2.4	1	2	2	2
97	28850	2	37	1	1	2.7	2	2	2	1	1	2	95	96	1	6.1	9.7	1	2	2	2
98	29068	2	37	1	1	2.65	2	2	2	1	1	2	100	100	0	0.98	1.5	1	2	2	2
99	29250	2	37	1	1	2.2	2	2	2	1	1	2	100	100	0	1.1	2.5	1	2	2	2
100	29224	1	43	1	1	2.6	2	2	2	1	1	2	97	97	0	2.8	1.6	1	2	2	2
101	29286	2	38	1	2	2.5	2	2	2	1	1	2	97	96	1	6.2	5.5	1	2	2	2
102	28861	1	42	1	1	2.5	2	2	2	1	1	2	97	96	1	2.9	6	1	2	2	2
103	29380	1	39	1	1	3.3	2	2	2	1	1	2	98	96	2	1.8	3.9	2	2	2	2
104	29381	2	34	1	4	2.6	2	2	2	1	1	2	97	96	1	5.3	2.2	1	2	2	2
105	29311	1	35	1	1	2.6	2	2	2	1	1	2	97	97	0	2.7	5.2	2	2	2	2
106	29439	1	32	1	1	2.8	2	2	2	1	1	2	97	97	0	1.6	3	2	2	2	2
107	29451	2	32	1	1	3.25	2	2	2	1	1	2	98	98	0	1.1	2	1	2	2	2
108	29393	2	38	1	1	2	2	2	2	1	1	2	96	97	1	4.1	2.8	1	2	2	2
109	29130	2	43	1	1	2.75	2	2	2	1	1	2	98	97	1	2.6	5.7	1	2	2	2
110	29504	1	37	1	1	3	2	2	2	1	1	2	100	98	2	1.8	4.2	1	2	2	2
111	29525	1	32	1	1	2.25	2	2	2	1	1	2	98	97	1	2	1.2	1	2	2	2
112	29283	1	29	1	1	3.25	2	2	2	1	1	2	98	97	1	1.3	1.7	1	2	2	2
113	29386	2	27	1	1	2.4	2	2	2	1	1	2	96	98	2	3.1	2.5	1	2	2	2
114	29552	2	27	1	1	2.5	2	2	2	1	1	2	97	99	2	1.7	1.2	1	2	2	2
115	29558	2	32	1	1	3.7	2	2	2	1	1	2	98	97	1	2.7	2.2	1	2	2	2
116	28426	2	34	1	1	2.75	2	2	2	1	1	2	98	96	2	2.3	4.8	1	2	2	2
117	29563	1	35	1	1	2	2	2	2	1	1	2	97	96	1	1.7	1.8	1	2	2	2

118	29506	1	29	1	1	2.25	2	2	2	1	1	2	98	98	0	5.6	1.9	1	2	2	2
119	29583	2	25	2	1	2.25	2	2	2	1	1	2	89	88	1	0.55	3.1	1	2	1	1
120	29583	2	42	1	2	2.3	2	2	2	1	1	2	96	98	2	1.3	1.2	1	2	2	2
121	29586	1	41	1	2	3.4	2	2	2	1	1	2	95	96	1	1.5	1.7	1	2	2	2
122	29604	1	36	1	2	3	2	2	2	1	1	2	97	100	3	1.8	1.4	1	2	2	2
123	29275	1	33	1	2	2.4	2	2	2	1	1	2	98	96	2	9.2	1.2	1	2	2	2
124	29600	2	35	1	2	2.6	2	2	2	1	1	2	97	96	1	2.6	1.9	1	2	2	2
125	28489	2	33	1	2	2.85	2	2	2	1	1	2	98	98	0	1.5	2.3	1	2	2	2
126	29610	2	33	1	2	2.3	2	2	2	1	1	2	99	98	1	1.5	1.3	1	2	2	2
127	29614	1	33	1	2	2.5	2	2	2	1	1	2	97	98	1	1	1.1	1	2	2	2
128	29628	2	31	1	2	3.25	2	2	2	1	1	2	98	97	1	2.7	6.2	1	2	2	2
129	29533	2	31	1	2	2.5	2	2	2	1	1	2	96	96	0	2.5	1.1	1	2	2	2
130	29001	1	29	1	2	3.25	2	2	2	1	1	2	96	96	0	2.2	4.5	2	2	2	2
131	28303	2	26	1	2	2.7	2	2	2	1	1	2	96	96	0	1.6	2.7	1	2	2	2
132	28988	2	27	1	2	2.5	2	2	2	1	1	2	98	97	1	0.86	4.4	2	2	2	2
133	29598	2	28	1	2	2.3	2	2	2	1	1	2	95	95	0	2.8	2.2	2	2	2	2
134	29654	2	28	1	2	3	2	2	2	1	1	2	97	99	2	2.1	1.7	1	2	2	2
135	29706	2	24	1	2	2.7	2	2	2	1	1	2	96	95	1	2.8	1.6	1	2	2	2
136	29284	2	24	1	2	3.25	2	2	2	1	1	2	98	99	1	2.4	3.2	1	2	2	2
137	29693	1	24	1	2	3.4	2	2	2	1	1	2	96	99	3	2.1	2.2	1	2	2	2
138	29691	1	24	1	2	3.6	2	2	2	1	1	2	100	99	1	0.73	79	1	2	2	2
139	29638	2	24	1	2	2.9	2	2	2	1	1	2	100	99	1	2.1	2.2	1	2	2	2
140	29661	2	24	1	2	3.2	2	2	2	1	1	2	98	96	2	1.1	2.6	1	2	2	2
141	29724	2	24	1	2	2.5	2	2	2	1	1	2	98	99	1	1.5	2	1	2	2	2
142	29609	2	36	1	1	3.25	2	2	2	1	1	2	97	98	1	1.3	1.3	1	2	2	2
143	29603	1	28	1	1	2.7	2	2	2	1	1	2	99	96	3	2.4	2.3	1	2	2	2
144	29601	2	30	1	1	2.6	2	2	2	1	1	2	98	96	2	1.3	2	1	2	2	2
145	29588	1	26	1	1	2.7	2	2	2	1	1	2	96	99	3	1.2	1	1	2	2	2
146	29708	2	24	1	1	2.5	2	2	2	1	1	2	98	97	1	0.78	3.1	1	2	2	2
147	29298	1	24	1	1	3.5	2	2	2	1	1	2	98	100	2	1.5	1.4	1	2	2	2
148	29746	2	24	1	3	2.5	2	2	2	1	1	2	96	96	0	1.1	1.1	1	2	2	2
149	29715	2	24	1	1	2.5	2	2	2	1	1	2	97	98	1	1.5	1.4	1	2	2	2
150	29764	1	42	1	1	3.25	1	2	2	1	1	2	97	98	1	1.2	1.3	1	2	2	2
151	29756	1	36	1	1	2.9	2	2	2	1	1	2	96	97	1	4	1.6	1	2	2	2
152	29781	2	34	1	1	2.5	2	2	2	1	1	2	96	98	2	2.5	2.2	1	2	2	2
153	29788	2	34	1	1	2.2	2	2	2	1	1	2	99	98	1	1.5	1.9	1	2	2	2
154	29748	1	35	1	1	2.8	2	2	2	1	1	2	98	99	1	2.3	1.3	1	2	2	2
155	29637	1	26	1	1	2.9	2	2	2	1	1	2	97	100	3	1.6	1.7	1	2	2	2
156	29864	2	24	1	1	2.5	2	2	2	1	1	2	99	100	1	1.3	1.5	1	2	2	2
157	28758	2	42	1	5	3.2	2	2	2	1	1	2	98	99	1	2.3	3.4	2	2	2	2
158	29890	1	41	1	1	2.25	2	2	2	1	1	2	98	96	2	3.1	2.7	1	2	2	2

159	29890	1	41	1	1	2.5	2	2	2	1	1	2	97	96	1	2.4	2.2	2	2	2	2
160	29895	1	37	1	1	3.5	2	2	2	1	1	2	98	98	0	1.7	1.2	1	2	2	2
161	29873	1	38	1	2	3.25	2	2	2	1	1	2	97	98	1	0.98	2	1	2	2	2
162	29683	1	37	1	2	3.3	2	2	2	1	1	2	96	95	1	1.1	1	1	2	2	2
163	29818	1	36	1	1	2	2	2	2	1	1	2	98	99	1	2.1	1.8	1	2	2	2
164	29899	2	35	1	1	3	2	2	2	1	1	2	96	95	1	1.8	1.2	2	2	2	2
165	29817	1	34	1	1	2.8	2	2	2	1	1	2	97	95	2	0.78	1.2	1	2	2	2
166	29909	1	33	1	1	2	2	2	2	1	1	2	98	96	2	3.4	2.8	1	2	2	2
167	29692	1	33	1	2	3.2	2	2	2	1	1	2	97	100	3	2.1	1.7	1	2	2	2
168	29707	2	30	1	2	2.75	2	2	2	1	1	2	98	98	0	1.7	1.2	1	2	2	2
169	30275	1	33	1	2	2.8	2	2	2	1	1	2	96	96	0	4.2	3.3	1	2	2	2
170	30240	1	33	1	2	3	2	2	2	1	1	2	99	96	3	0.92	1.6	1	2	2	2
171	30328	1	30	1	2	2.75	2	2	2	1	1	2	98	98	0	0.98	1.1	2	2	2	2
172	30320	2	30	1	2	3	2	2	2	1	1	2	98	97	1	1.8	3.5	1	2	2	2
173	30297	2	30	1	2	2.41	2	2	2	1	1	2	96	96	0	3.6	4	1	2	2	2
174	30333	2	27	1	2	2.6	2	2	2	1	1	2	96	97	1	2	1	1	2	2	2
175	29934	2	26	1	2	3.25	2	2	2	1	1	2	97	99	2	1.9	1.5	1	2	2	2
176	30225	2	26	1	2	3.3	2	2	2	1	1	2	99	98	1	1.8	2.3	1	2	2	2
177	30353	2	27	1	2	2.75	2	2	2	1	1	2	96	96	0	2.5	3.8	1	2	2	2
178	29927	1	28	1	2	3	2	2	2	1	1	2	98	98	0	1.6	2.1	1	2	2	2
179	29962	1	25	1	2	2.5	2	2	2	1	1	2	98	96	2	2.3	2.7	1	2	2	2
180	30283	1	25	1	2	2	2	2	2	1	1	2	96	98	2	1.6	4.3	1	2	2	2
181	30348	2	24	1	2	3	2	2	2	1	1	2	99	98	1	1.9	0.93	1	2	2	2
182	30271	2	43	1	1	2.7	2	2	2	1	1	2	96	97	1	2.1	1.7	1	2	2	2
183	30291	2	42	1	1	2.85	2	2	2	1	1	2	96	97	1	2.6	1.7	1	2	2	2
184	28057	1	41	1	1	2.55	2	2	2	1	1	2	96	98	2	1.6	2.7	1	2	2	2
185	30306	2	42	1	1	3	2	2	2	1	1	2	96	98	2	1.2	1.4	2	2	2	2
186	30223	2	36	1	1	3	2	2	2	1	1	2	97	97	0	3.8	2.9	2	2	2	2
187	30156	2	34	1	1	2.4	2	2	2	1	1	2	97	97	0	9.1	4.1	1	2	2	2
188	30209	1	40	1	1	2.5	2	2	2	1	1	2	97	100	3	1.4	1.1	1	2	2	2
189	30164	1	34	1	1	2.75	2	2	2	1	1	2	98	98	0	3.1	5	1	2	2	2
190	30308	1	33	1	1	3.1	2	2	2	1	1	2	98	96	2	2.6	1.7	1	2	2	2
191	30322	1	31	1	1	2.25	2	2	2	1	1	2	96	96	0	5.6	7	1	2	2	2
192	30329	1	29	1	1	2.75	2	2	2	1	1	2	98	98	0	3.8	2.5	1	2	2	2
193	30370	2	25	1	1	3	2	2	2	1	1	2	96	97	1	3.9	1.7	1	2	2	2
194	30371	1	24	1	1	2.4	2	2	2	1	1	2	100	98	2	2.9	2.5	1	2	2	2
195	30362	1	24	1	1	2.6	2	2	2	1	1	2	97	99	2	1.4	5	1	2	2	2
196	30360	1	24	1	1	2.25	2	2	2	1	1	2	99	98	1	1.5	1.9	1	2	2	2
197	30352	2	24	1	1	2.5	2	2	2	1	1	2	98	96	2	1.6	2.1	1	2	2	2
198	30350	2	42	1	2	3	2	2	2	1	1	2	97	98	1	1.9	0.8	1	2	2	2
199	29745	2	43	1	2	3	2	2	2	1	1	2	96	96	0	2.9	1.5	2	2	2	2

200	29932	1	33	1	2	2.55	2	2	2	1	1	2	97	98	1	1.6	3.1	1	2	2	2
201	30417	2	34	1	2	3.75	2	2	2	1	1	2	100	97	3	0.8	0.98	1	2	2	2
202	30429	1	31	1	2	2.75	2	2	2	1	1	2	98	98	0	0.83	1.1	2	2	2	2
203	29953	1	31	1	2	2.75	2	2	2	1	1	2	97	98	1	3.9	3.7	1	2	2	2
204	30449	2	26	1	2	3.2	2	2	2	1	1	2	96	96	0	2.9	2.7	2	2	2	2
205	30236	2	25	1	2	2.75	2	2	2	1	1	2	98	98	0	0.85	2.6	2	2	2	2
206	30424	2	26	1	2	2.75	2	2	2	1	1	2	100	99	1	0.97	0.81	1	2	2	2
207	29686	2	24	1	2	3.2	2	2	2	1	1	2	97	98	1	1.9	1.8	1	2	2	2
208	30448	2	25	1	2	2.4	2	2	2	1	1	2	98	96	2	2.3	2.3	1	2	2	2
209	29898	2	24	1	2	2.7	2	2	2	1	1	2	98	96	2	2.2	4	2	2	2	2
210	30323	2	41	1	1	2.3	2	2	2	1	1	2	96	97	1	1.4	0.98	1	2	2	2
211	30383	1	39	1	1	2.75	2	2	2	1	1	2	97	98	1	2.4	1.7	2	2	2	2
212	29946	1	36	1	1	2.5	2	2	2	1	1	2	98	98	0	3.9	2.3	2	2	2	2
213	30347	1	35	1	1	3.25	2	2	2	1	1	2	96	96	0	1.8	2.3	1	2	2	2
214	30272	1	34	1	1	3	2	2	2	1	1	2	96	98	2	3	1	1	2	2	2
215	30396	2	33	1	1	3	2	2	2	1	1	2	96	96	0	1.8	2.7	1	2	2	2
216	29739	1	29	1	1	2.75	2	2	2	1	1	2	96	96	0	1.9	2.8	2	2	2	2
217	30407	1	29	1	1	3	2	2	2	1	1	2	97	98	1	1.6	3.3	1	2	2	2
218	30437	2	28	1	1	2.6	2	2	2	1	1	2	97	96	1	3.8	4.7	2	2	2	2
219	30434	2	28	1	1	2.25	2	2	2	1	1	2	96	97	1	2.4	2.9	1	2	2	2
220	30092	1	27	1	1	3.75	2	2	2	1	1	2	97	97	0	1.8	2	2	2	2	2
221	30231	1	26	1	1	3.25	2	2	2	1	1	2	99	100	1	5.9	1.1	2	2	2	2
222	30435	1	25	1	1	3.25	2	2	2	1	1	2	97	97	0	3.6	3.6	1	2	2	2
223	30467	2	24	1	1	3.25	2	2	2	1	1	2	97	99	2	2.1	1.5	1	2	2	2
224	30455	1	24	1	1	3	2	2	2	1	1	2	96	96	0	6.6	2.2	1	2	2	2
225	30375	2	24	1	1	2.5	2	2	2	1	1	2	97	98	1	1.6	2.2	2	2	2	2
226	30485	1	24	1	3	2.25	2	2	2	1	1	2	97	96	1	3	2.5	1	2	2	2
227	30438	1	24	1	1	2.25	1	2	2	1	1	2	98	97	1	1.6	1.9	1	2	2	2
228	30234	1	31	1	1	3.25	2	2	2	1	1	2	99	99	0	1.6	1.1	1	2	2	2
229	30501	1	40	1	1	2.9	2	2	2	1	1	2	96	96	0	1.9	1.7	2	2	2	2
230	30497	1	37	1	1	2.5	2	2	2	1	1	2	99	96	3	2.5	1.4	1	2	2	2
231	30495	1	37	1	1	3.2	2	2	2	1	1	2	100	99	1	1.6	2.5	1	2	2	2
232	30463	1	32	1	1	2.4	2	2	2	1	1	2	96	97	1	3	1.9	1	2	2	2
233	30474	1	27	1	1	2.25	2	2	2	1	1	2	99	97	2	1.6	3.1	1	2	2	2
234	30567	1	26	1	1	2.75	2	2	2	1	1	2	97	100	3	1.8	1.8	1	2	2	2
235	30552	2	24	1	1	2.6	2	2	2	1	1	2	98	98	0	1.9	3.1	1	2	2	2
236	30538	2	24	1	1	2.6	2	2	2	1	1	2	98	97	1	2.8	5.4	1	2	2	2
237	30165	1	24	1	1	3.25	2	2	2	1	1	2	99	98	1	2.8	5.4	1	2	2	2
238	30492	2	24	1	1	2.4	2	2	2	1	1	2	97	96	1	1.8	2.4	1	2	2	2
239	30490	2	42	1	2	3.25	2	2	2	1	1	2	99	98	1	2.8	1.9	2	2	2	2
240	30502	1	38	1	2	2.7	2	2	2	1	1	2	98	96	2	3.4	2.7	1	2	2	2

241	30374	1	37	1	2	3.7	2	2	2	1	1	2	96	97	1	3.8	1.8	2	2	2	2
242	29827	2	34	1	2	2.4	2	2	2	1	1	2	97	100	3	2.5	1.9	1	2	2	2
243	30462	2	34	1	2	2.7	2	2	2	1	1	2	98	97	1	1.9	1.6	1	2	2	2
244	30239	1	33	1	2	3.4	2	2	2	1	1	2	98	98	0	2.3	1.2	1	2	2	2
245	30397	2	32	1	2	2.75	1	2	2	1	1	2	98	97	1	2.2	1.8	1	2	2	2
246	30509	2	32	1	2	2.9	2	2	2	1	1	2	96	97	1	2.9	2.1	1	2	2	2
247	30094	2	27	1	2	2.5	2	2	2	1	1	2	100	100	0	1.6	1.1	2	2	2	2
248	30120	2	26	1	2	3.3	2	2	2	1	1	2	97	98	1	1	1.2	1	2	2	2
249	30246	1	24	1	2	3.3	2	2	2	1	1	2	97	98	1	1.3	1.5	1	2	2	2
250	30346	1	28	1	2	3.25	2	2	2	1	1	2	98	98	0	1.9	2.7	1	2	2	2
251	30557	1	26	1	2	3.25	2	2	2	1	1	2	98	99	1	1	1.3	2	2	2	2
252	30545	1	27	1	2	2.4	2	2	2	1	1	2	99	99	0	1.6	1.9	1	2	2	2
253	29954	2	28	1	2	2.25	2	2	2	1	1	2	97	96	1	1.6	1.6	1	2	2	2
254	30514	1	24	1	2	2.75	2	2	2	1	1	2	96	95	1	3	2.9	2	2	2	2
255	30589	1	24	1	2	2.5	2	2	2	1	1	2	98	96	2	1.6	3.8	1	2	2	2
256	30595	1	24	1	2	2.5	2	2	2	1	1	2	99	97	2	0.93	1.4	1	2	2	2
257	30391	1	43	1	1	2.75	2	2	2	1	1	2	96	96	0	7.8	4.6	2	2	2	2
258	30615	2	41	1	1	2.8	2	2	2	1	1	2	99	99	0	1.6	1.9	2	2	2	2
259	30621	1	41	1	1	2.5	2	2	2	1	1	2	93	94	1	6.2	5	1	2	1	2
260	30625	1	40	1	1	3	2	2	2	1	1	2	96	96	0	1.6	1.2	1	2	2	2
261	30634	1	40	1	1	2.5	2	2	2	1	1	2	98	96	2	2.7	2.7	1	2	2	2
262	30600	2	39	1	1	2.75	2	2	2	1	1	2	99	97	2	4.7	3.6	1	2	2	2
263	30544	1	38	1	1	2.5	2	2	2	1	1	2	99	98	1	2.4	2.4	1	2	2	2
264	30580	2	34	1	1	3	2	2	2	1	1	2	97	96	1	2.6	1.4	1	2	2	2
265	30611	2	32	1	1	2.6	2	2	2	1	1	2	96	96	0	2.6	1.1	1	2	2	2
266	30259	2	30	1	1	2.75	2	2	2	1	1	2	96	99	3	7.2	6.6	2	2	2	2
267	30640	1	31	1	1	2.75	2	2	2	1	1	2	96	97	1	4.3	3.6	2	2	2	2
268	30519	1	29	1	1	2.7	2	2	2	1	1	2	98	98	0	4.1	1.6	1	2	2	2
269	30666	1	31	1	4	2.25	2	2	2	1	1	2	97	96	1	2.1	2	1	2	2	2
270	30726	2	24	1	1	2.25	2	2	2	1	1	2	96	97	1	2.2	1.8	1	2	2	2
271	30728	2	24	1	1	2.6	2	2	2	1	1	2	97	96	1	4.6	1.5	1	2	2	2
272	30682	1	24	1	1	2.5	2	2	2	1	1	2	98	97	1	1.1	2.5	2	2	2	2
273	29928	1	31	1	1	3.3	2	2	2	1	1	2	98	97	1	2.4	1.8	2	2	2	2
274	30622	2	29	1	2	1.7	2	2	2	1	1	2	97	98	1	1	0.91	2	2	2	2
275	28932	2	33	1	2	2.9	2	2	2	1	1	2	96	97	1	3.9	1.9	1	2	2	2
276	28357	2	33	1	2	2.6	2	2	2	1	1	2	97	98	1	1.9	2.6	2	2	2	2
277	30668	1	27	1	2	3.4	2	2	2	1	1	2	96	96	0	5.5	3.2	1	2	2	2
278	30610	2	42	1	1	2.8	2	2	2	1	1	2	96	97	1	7.2	2.4	1	2	2	2
279	30732	2	42	1	1	2.4	2	2	2	1	1	2	96	99	3	6.9	5.9	1	2	2	2
280	30748	2	60	1	1	2.4	2	2	2	1	1	2	97	96	1	4.3	1.8	1	2	2	2
281	30596	2	39	1	1	2.75	2	2	2	1	1	2	99	97	2	2.1	5.1	1	2	2	2

282	30671	2	39	1	1	2.5	2	2	2	1	1	2	97	98	1	2.1	2	1	2	2	2
283	30559	1	34	1	1	3.3	2	2	2	1	1	2	96	96	0	4.8	5.7	1	2	2	2
284	30776	1	33	1	1	3.5	2	2	2	1	1	2	97	96	1	5.5	4.6	1	2	2	2
285	30833	1	24	1	1	2.75	2	2	2	1	1	2	98	98	0	4.3	1.2	1	2	2	2
286	30830	2	25	1	1	2.5	2	2	2	1	1	2	98	98	0	2.6	1.2	1	2	2	2
287	30762	2	24	1	1	2.6	2	2	2	1	1	2	96	97	1	3	4	1	2	2	2
288	30521	1	43	1	2	2.8	2	2	2	1	1	2	97	97	0	0.8	2.6	2	2	2	2
289	30750	1	43	1	2	3	2	2	2	1	1	2	97	96	2	1.9	4.6	1	2	2	2
290	30756	2	38	1	2	2.6	2	2	2	1	1	2	96	97	1	3.5	2.2	1	2	2	2
291	30765	2	36	1	2	3	2	2	2	1	1	2	98	97	1	3	1.5	1	2	2	2
292	30747	1	35	1	2	3	2	2	2	1	1	2	100	100	0	1.1	1.6	2	2	2	2
293	30228	1	33	1	2	3	2	2	2	1	1	2	96	96	0	1.7	3.7	1	2	2	2
294	29194	1	33	1	2	2.6	2	2	2	1	1	2	97	97	0	1.9	3.3	1	2	2	2
295	29813	1	32	1	2	2.7	2	2	2	1	1	2	98	99	1	2.4	1.6	1	2	2	2
296	30720	1	32	1	2	3	2	2	2	1	1	2	97	97	0	2.2	3.1	1	2	2	2
297	30535	1	31	1	2	3.5	2	2	2	1	1	2	98	96	2	1.6	2	1	2	2	2
298	30638	1	31	1	2	3	2	2	2	1	1	2	99	99	0	1.9	2	2	2	2	2
299	30784	1	31	1	2	3	2	2	2	1	1	2	98	96	2	1.1	3.8	1	2	2	2
300	30749	2	31	1	2	2.5	2	2	2	1	1	2	96	99	3	7.7	4	1	2	2	2
301	30788	2	27	1	2	2.9	2	2	2	1	1	2	96	96	0	2.8	3.7	1	2	2	2
302	30814	1	36	1	2	2.6	2	2	2	1	1	2	99	99	0	1.6	2.2	1	2	2	2
303	30705	1	27	1	2	2.9	2	2	2	1	1	2	99	100	1	1.8	0.97	1	2	2	2
304	30704	1	25	1	2	3.2	2	2	2	1	1	2	98	97	1	1	2.8	1	2	2	2
305	30800	1	25	1	2	3.2	2	2	2	1	1	2	98	99	1	1.4	1.5	2	2	2	2
306	30828	2	24	1	2	2.75	2	2	2	1	1	2	96	97	1	1.8	1.6	1	2	2	2
307	30573	2	24	1	2	3.5	2	2	2	1	1	2	98	96	2	1.8	6.7	1	2	2	2
308	30680	1	24	1	2	2.8	2	2	2	1	1	2	96	97	1	6.9	2.1	1	2	2	2
309	30865	1	43	1	2	3.3	2	2	2	1	1	2	97	98	1	5.2	2	1	2	2	2
310	30884	2	42	1	2	3.2	2	2	2	1	1	2	97	96	1	2	1	1	2	2	2
311	30518	1	33	1	2	2.9	2	2	2	1	1	2	99	100	1	1.4	2	1	2	2	2
312	30892	2	33	1	2	2.5	2	2	2	1	1	2	97	97	0	1.6	2.9	2	2	2	2
313	30341	2	33	1	2	2.7	2	2	2	1	1	2	99	99	0	1.5	2.8	1	2	2	2
314	30777	1	33	1	2	3.25	2	2	2	1	1	2	96	96	0	3.4	1.7	1	2	2	2
315	30223	1	32	1	2	2.7	2	2	2	1	1	2	100	99	1	1.3	2.1	1	2	2	2
316	29865	2	32	1	2	3.25	2	2	2	1	1	2	96	97	1	2.2	1.8	1	2	2	2
317	30901	2	31	1	2	3	2	2	2	1	1	2	97	98	1	2.8	1.8	1	2	2	2
318	30974	2	27	1	2	3	2	2	2	1	1	2	97	96	1	2.2	3.3	2	2	2	2
319	30963	2	25	1	2	2.9	2	2	2	1	1	2	96	97	1	3.1	2.7	1	2	2	2
320	30871	1	24	1	2	2.75	2	2	2	1	1	2	97	98	1	1.5	1.9	1	2	2	2
321	30991	2	24	1	2	3.25	2	2	2	1	1	2	99	97	2	2.7	1.8	1	2	2	2
322	30591	1	42	1	1	2.6	2	2	2	1	1	2	100	99	1	2.2	1.8	1	2	2	2

323	30708	2	40	1	1	2.7	2	2	2	1	1	2	98	98	0	2	2.3	1	2	2	2
324	30812	2	34	1	1	3.2	2	2	2	1	1	2	98	96	2	3.2	6.1	2	2	2	2
325	30684	1	36	1	1	3.5	2	2	2	1	1	2	96	96	0	4.9	2.4	1	2	2	2
326	30905	2	33	1	1	2.7	2	2	2	1	1	2	99	97	2	2.3	2.8	1	2	2	2
327	30743	2	29	1	1	2.5	2	2	2	1	1	2	100	98	2	4.3	2.1	1	2	2	2
328	30948	2	30	1	1	2.6	2	2	2	1	1	2	100	98	2	2.1	2.2	1	2	2	2
329	30935	2	30	1	1	2.3	2	2	2	1	1	2	97	98	1	1.3	1.9	1	2	2	2
330	30971	2	34	1	1	2.6	2	2	2	1	1	2	97	98	1	2	2.1	2	2	2	2
331	30924	1	28	1	1	2.25	2	2	2	1	1	2	100	100	0	0.96	1.5	1	2	2	2
332	30907	2	27	1	1	2.75	2	2	2	1	1	2	96	97	1	2.7	5.8	1	2	2	2
333	30969	1	24	1	1	3.2	2	2	2	1	1	2	97	96	1	1.8	2.4	1	2	2	2
334	30896	1	24	1	1	3	2	2	2	1	1	2	96	96	0	2.9	2.2	1	2	2	2
335	31021	1	24	1	1	2.5	2	2	2	1	1	2	98	97	1	5.9	2.9	1	2	2	2
336	30909	2	24	1	1	2.4	2	2	2	1	1	2	96	97	1	5.4	4.8	1	2	2	2
337	30996	1	24	1	5	3.2	2	2	2	1	1	2	98	96	2	2.6	2.8	2	2	2	2
338	30960	2	43	1	1	3	2	2	2	1	1	2	96	97	1	1.5	1.9	1	2	2	2
339	30968	1	43	1	1	2.5	2	2	2	1	1	2	96	97	1	2.8	3.2	1	2	2	2
340	30977	2	38	1	1	3.3	2	2	2	1	1	2	98	100	2	2.4	1.3	1	2	2	2
341	31024	2	37	1	1	2.5	2	2	2	1	1	2	96	96	0	2	2.8	1	2	2	2
342	30953	2	37	1	1	2.2	2	2	2	1	1	2	97	97	0	6.5	3.1	2	2	2	2
343	31016	2	35	1	1	4	2	2	2	1	1	2	97	97	0	2.8	5.4	1	2	2	2
344	31047	1	36	1	1	3	2	2	2	1	1	2	97	98	1	6.4	2.4	1	2	2	2
345	30938	2	30	1	1	2.1	2	2	2	1	1	2	97	97	0	2.6	2.9	1	2	2	2
346	31068	1	28	1	1	2.25	2	2	2	1	1	2	97	97	0	3.5	4.8	1	2	2	2
347	31077	2	27	1	1	2.6	2	2	2	1	1	2	96	97	1	3.7	4	1	2	2	2
348	31063	2	26	1	1	2.9	2	2	2	1	1	2	97	99	2	1.8	2.2	1	2	2	2
349	30994	1	26	1	1	2.5	2	2	2	1	1	2	96	96	0	2.9	3.1	1	2	2	2
350	30949	2	24	1	1	3.6	2	2	2	1	1	2	96	96	0	2.2	3.8	1	2	2	2
351	31070	1	24	1	1	3.1	2	2	2	1	1	2	96	98	2	2.6	1.7	1	2	2	2
352	31118	2	24	1	4	2.25	2	2	2	1	1	2	96	97	1	1.6	1.7	2	2	2	2
353	30841	2	24	1	1	3	2	2	2	1	1	2	96	96	0	1	1.7	1	2	2	2
354	31122	1	24	1	1	2.75	2	2	2	1	1	2	98	98	0	1.2	4.2	1	2	2	2
355	31153	2	24	1	1	2.5	2	2	2	1	1	2	96	96	0	7.2	5.7	1	2	2	2
356	30962	1	43	1	2	2.75	2	2	2	1	1	2	99	99	0	1.8	1.5	1	2	2	2
357	31017	1	34	1	2	3.3	2	2	2	1	1	2	98	98	0	0.89	3.9	2	2	2	2
358	31048	2	37	1	2	2.8	2	2	2	1	1	2	97	98	1	2.6	3.8	1	2	2	2
359	31029	1	33	1	2	3	2	2	2	1	1	2	99	99	0	1.3	2.6	1	2	2	2
360	29924	1	33	1	2	3.7	2	2	2	1	1	2	98	99	1	2.2	1	2	2	2	2
361	30858	2	32	1	2	3.4	2	2	2	1	1	2	97	99	2	3.8	4.1	1	2	2	2
362	30558	2	33	1	2	2.75	2	2	2	1	1	2	96	97	1	3.2	3	1	2	2	2
363	30515	1	32	1	2	2.7	2	2	2	1	1	2	96	97	1	2.8	3.2	1	2	2	2

364	30681	2	27	1	2	2.5	2	2	2	1	1	2	97	96	1	2.4	1.2	1	2	2	2
365	31108	2	26	1	2	2.3	2	2	2	1	1	2	97	96	1	5.6	2.2	2	2	2	2
366	31078	1	25	1	2	3.3	2	2	2	1	1	2	96	96	0	1.7	3.1	1	2	2	2
367	30843	1	24	1	2	3.5	2	2	2	1	1	2	96	96	0	2.7	1.8	1	2	2	2
368	30236	1	24	1	2	2.25	2	2	2	1	1	2	96	96	0	1.7	3.2	1	2	2	2
369	30848	1	24	1	2	3	2	2	2	1	1	2	99	99	0	1.4	2.2	1	2	2	2
370	31162	1	43	1	1	3	2	2	2	1	1	2	96	97	1	2.2	1.4	1	2	2	2
371	30123	1	42	1	1	3.5	2	2	2	1	1	2	97	97	0	6.1	2.1	1	2	2	2
372	31184	1	39	1	1	2.5	2	2	2	1	1	2	96	96	0	2.1	1.8	1	2	2	2
373	31129	2	40	1	1	2.25	2	2	2	1	1	2	99	99	0	1.6	2.5	1	2	2	2
374	31182	1	36	1	1	2.5	2	2	2	1	1	2	98	98	0	1.6	3.5	1	2	2	2
375	31169	2	35	1	1	3.1	2	2	2	1	1	2	99	97	2	3.1	3.7	2	2	2	2
376	31202	2	32	1	1	3	2	2	2	1	1	2	96	96	0	6.4	5.8	1	2	2	2
377	31181	2	32	1	1	2.2	2	2	2	1	1	2	96	96	0	6.8	2.9	1	2	2	2
378	30644	1	29	1	1	3.25	2	2	2	1	1	2	98	98	0	3.1	2.9	1	2	2	2
379	31236	1	27	1	1	2	2	2	2	1	1	2	96	97	1	2.4	2.1	1	2	2	2
380	31140	1	28	1	1	2.4	2	2	2	1	1	2	98	97	1	2.4	1.6	2	2	2	2
381	31195	1	25	1	1	2	2	2	2	1	1	2	97	99	2	1.1	4.1	1	2	2	2
382	31210	1	24	1	1	2.7	2	2	2	1	1	2	98	99	1	3.5	1.8	1	2	2	2
383	31222	1	26	1	1	2.5	2	2	2	1	1	2	97	97	0	1.4	2.7	1	2	2	2
384	30730	2	24	1	1	2.9	2	2	2	1	1	2	96	98	2	2.8	1.7	1	2	2	2
385	31285	1	24	1	1	2.1	2	2	2	1	1	2	96	96	0	2.9	4.4	1	2	2	2
386	31208	1	24	1	2	2.75	2	2	2	1	1	2	97	96	1	1.1	2.1	1	2	2	2
387	31170	1	42	1	2	2.75	2	2	2	1	1	2	98	97	1	2.2	1.8	1	2	2	2
388	31147	2	38	1	2	2.75	2	2	2	1	1	2	96	97	1	4.2	4.1	1	2	2	2
389	31165	1	37	1	2	3.25	2	2	2	1	1	2	99	99	0	1.7	3.1	1	2	2	2
390	31185	2	37	1	2	1.8	2	2	2	1	1	2	97	96	1	2.4	1.6	1	2	2	2
391	31172	2	32	1	2	2.8	2	2	2	1	1	2	97	96	1	4.3	1.6	1	2	2	2
392	31176	2	33	1	2	2.3	2	2	2	1	1	2	96	97	1	6.2	4.1	1	2	2	2
393	30169	1	31	1	2	3.25	2	2	2	1	1	2	97	96	1	5.1	3.2	1	2	2	2
394	30999	2	33	1	2	3.5	2	2	2	1	1	2	98	96	2	1.2	3.9	2	2	2	2
395	30839	1	32	1	2	3.1	2	2	2	1	1	2	98	96	2	1.5	1.9	1	2	2	2
396	31173	2	32	1	2	3.7	2	2	2	1	1	2	97	97	0	6.2	5.1	1	2	2	2
397	31087	1	30	1	2	2.9	2	2	2	1	1	2	97	97	0	4.9	1.9	2	2	2	2
398	31224	1	28	1	2	2.9	2	2	2	1	1	2	98	98	0	3.4	1.4	1	2	2	2
399	31225	1	27	1	2	2.75	2	2	2	1	1	2	96	96	0	2.8	1.4	1	2	2	2
400	31229	2	24	1	2	2.9	2	2	2	1	1	2	99	97	2	2.2	1.7	1	2	2	2
401	31136	1	24	1	2	3	2	2	2	1	1	2	96	96	0	3.8	4.1	2	2	2	2
402	32517	2	32	1	1	2.75	2	2	2	1	1	2	98	99	1	0.74	1.2	1	2	2	2
403	32495	1	28	1	1	2.5	2	2	2	1	1	2	98	99	1	1.8	1.4	1	2	2	2
404	32663	1	27	1	1	2.31	2	2	2	1	1	2	96	99	3	0.93	1.1	1	2	2	2

405	32539	1	24	1	1	2.5	2	2	2	1	1	2	98	96	2	3.1	1.6	1	2	2	2
406	32718	1	43	1	2	2.9	2	2	2	1	1	2	99	100	1	2	0.87	1	2	2	2
407	31788	2	41	1	2	2.5	2	2	2	1	1	2	100	100	0	2	0.97	2	2	2	2
408	32712	2	40	1	2	2.4	2	2	2	1	1	2	98	98	0	1.5	1.4	2	2	2	2
409	32697	1	40	1	2	3	2	2	2	1	1	2	96	96	0	1.8	2.2	1	2	2	2
410	32732	1	35	1	2	3	2	2	2	1	1	2	97	97	0	1.8	3.7	1	2	2	2
411	32722	2	33	1	2	2.45	2	2	2	1	1	2	100	98	2	2.5	2.1	1	2	2	2
412	32759	1	32	1	2	2.5	2	2	2	1	1	2	97	96	1	2.6	2.4	1	2	2	2
414	32724	2	48	1	2	3	2	2	2	1	1	2	98	97	1	2.4	2.2	2	2	2	2
413	32262	2	31	1	2	3.5	2	2	2	1	1	2	98	97	1	2	3.8	1	2	2	2
415	32776	2	27	1	2	3	2	2	2	1	1	2	96	96	0	3.5	2.7	1	2	2	2
416	31910	2	24	1	2	2.25	2	2	2	1	1	2	96	97	1	5.7	4.4	1	2	2	2
417	32409	1	24	1	2	3.25	2	2	2	1	1	2	96	96	0	3.6	3.2	1	2	2	2
418	32509	1	43	1	1	3	2	2	2	1	1	2	97	97	0	2.3	1.5	1	2	2	2
419	32214	1	40	1	1	2.7	2	2	2	1	1	2	92	91	1	1.6	3.1	1	2	1	1
420	32825	2	39	1	1	2.25	2	2	2	1	1	2	96	96	0	4.6	2.5	2	2	2	2
421	32786	1	39	1	1	2.25	2	2	2	1	1	2	99	99	0	2.5	1.1	1	2	2	2
422	32846	1	41	1	1	3	2	2	2	1	1	2	97	96	1	2.5	1.7	1	2	2	2
423	32687	2	41	1	1	2.25	2	2	2	1	1	2	96	96	0	2.6	2.8	1	2	2	2
424	32253	1	38	1	1	2	2	2	2	1	1	2	96	96	0	4	2.7	1	2	2	2
425	32813	2	36	1	1	2.5	2	2	2	1	1	2	97	98	1	4.6	2.7	2	2	2	2
426	32852	2	35	1	1	2.25	2	2	2	1	1	2	100	100	0	1.8	1	1	2	2	2
427	32881	1	35	1	1	2.75	2	2	2	1	1	2	97	100	3	3	5.8	1	2	2	2
428	32814	1	31	1	1	2.75	2	2	2	1	1	2	97	96	1	3.5	2.9	1	2	2	2
429	32025	2	30	1	1	2.5	2	2	2	1	1	2	99	99	0	3	3	1	2	2	2
430	32879	1	24	1	1	2.75	2	2	2	1	1	2	96	97	1	48	4.5	1	2	2	2
431	32880	1	24	1	1	2.4	2	2	2	1	1	2	97	96	1	9.7	3.7	1	2	2	2
432	32882	1	24	1	1	3.2	2	2	2	1	1	2	97	98	1	1.3	1.3	2	2	2	2
433	32538	1	24	1	1	2.4	2	2	2	1	1	2	96	96	0	3.2	1.5	1	2	2	2
434	32841	2	43	1	2	3.75	2	2	2	1	1	2	98	96	2	1.5	1.3	1	2	2	2
435	32723	2	43	1	2	2.95	2	2	2	1	1	2	96	97	1	1.4	3.6	2	2	2	2
436	32843	1	42	1	2	2.5	2	2	2	1	1	2	96	96	0	3	5.7	1	2	2	2
437	32840	1	43	1	2	2.75	2	2	2	1	1	2	98	99	1	3.5	1.8	1	2	2	2
438	32772	2	38	1	2	3	2	2	2	1	1	2	99	99	0	1.5	1.9	1	2	2	2
439	32874	1	36	1	2	3.75	2	2	2	1	1	2	99	98	1	1.7	2.9	1	2	2	2
440	32668	2	36	1	2	3.6	2	2	2	1	1	2	96	96	0	1.3	1.4	1	2	2	2
441	32394	2	33	1	2	2.55	2	2	2	1	1	2	97	99	2	3.8	1.8	1	2	2	2
442	32688	2	33	1	2	3.6	2	2	2	1	1	2	97	96	1	2.8	4	2	2	2	2
443	32829	2	33	1	2	3.45	2	2	2	1	1	2	97	98	1	2	1.9	1	2	2	2
444	32918	1	32	1	2	2.5	2	2	2	1	1	2	96	97	1	4	5	2	2	2	2
445	32837	1	34	1	2	3	2	2	2	1	1	2	99	100	1	2.8	1.5	1	2	2	2

446	32959	2	41	1	1	2.5	2	2	2	1	1	2	96	97	1	1	0.94	1	2	2	2
447	32959	2	41	1	1	2.4	2	2	2	1	1	2	100	98	2	0.95	2.4	1	2	2	2
448	32972	2	41	1	1	2.9	2	2	2	1	1	2	96	96	0	2.1	5.6	1	2	2	2
449	32399	1	40	1	1	2.7	2	2	2	1	1	2	96	98	2	0.88	98	1	2	2	2
450	32978	1	40	1	1	2.8	2	2	2	1	1	2	96	97	1	2	2.3	1	2	2	2
451	32969	2	39	1	1	2.8	2	2	2	1	1	2	96	96	0	3.9	3.8	1	2	2	2
452	32965	2	40	1	1	3	2	2	2	1	1	2	97	98	1	0.95	2.8	2	2	2	2
453	32986	1	40	1	1	2.25	2	2	2	1	1	2	96	97	1	3.2	1	1	2	2	2
454	32984	2	33	1	1	2.6	2	2	2	1	1	2	96	96	0	2	2	1	2	2	2
455	32950	1	26	1	1	2.4	2	2	2	1	1	2	98	99	1	2.5	2.8	2	2	2	2
456	32958	1	25	1	1	2.9	2	2	2	1	1	2	99	100	1	1.2	1.1	1	2	2	2
457	32412	1	24	1	1	3.25	2	2	2	1	1	2	99	100	1	0.8	0.95	1	2	2	2
458	32796	2	42	1	2	3.3	2	2	2	1	1	2	96	96	0	1.5	2.5	1	2	2	2
459	32655	2	37	1	2	3	2	2	2	1	1	2	97	96	1	1.8	4.4	1	2	2	2
460	33004	2	33	1	2	3	2	2	2	1	1	2	97	98	1	1.5	3.6	2	2	2	2
461	33003	2	31	1	2	2.85	2	2	2	1	1	2	99	98	1	1.3	1.2	2	2	2	2
462	33001	1	31	1	2	3.5	2	2	2	1	1	2	97	98	1	1.5	1.3	1	2	2	2
463	33008	1	28	1	2	3.65	2	2	2	1	1	2	98	98	0	1.6	1.3	1	2	2	2
464	33020	2	28	1	2	2.55	2	2	2	1	1	2	98	97	1	1.9	2.8	1	2	2	2
465	32781	2	24	1	2	2.5	2	2	2	1	1	2	98	96	2	1.1	1.8	1	2	2	2
466	33030	2	24	1	2	2.6	2	2	2	1	1	2	96	96	0	1.5	4.2	1	2	2	2
467	33048	2	43	1	1	3	2	2	2	1	1	2	98	96	2	2.1	3.2	1	2	2	2
468	33052	2	41	1	1	3.25	2	2	2	1	1	2	99	100	1	3	1.8	1	2	2	2
469	33029	1	41	1	1	2.2	2	2	2	1	1	2	97	96	1	1.2	2.6	1	2	2	2
470	33061	2	40	1	1	3.1	2	2	2	1	1	2	98	96	2	1.4	4.7	1	2	2	2
471	32949	1	38	1	1	2.4	2	2	2	1	1	2	98	98	0	1.5	1.6	1	2	2	2
472	33063	1	36	1	1	3.6	2	2	2	1	1	2	96	97	1	1.8	1.7	1	2	2	2
473	33050	1	36	1	1	2.75	2	2	2	1	1	2	98	96	2	1.3	2.8	1	2	2	2
474	32904	1	35	1	1	2	2	2	2	1	1	2	96	96	0	2.3	2.3	1	2	2	2
475	33116	2	31	1	1	2.5	2	2	2	1	1	2	96	97	1	6.8	2.7	2	2	2	2
476	32894	2	29	1	1	3.3	2	2	2	1	1	2	99	100	1	1.4	1.4	1	2	2	2
477	32494	1	29	1	1	3	2	2	2	1	1	2	97	97	0	1.1	3.8	1	2	2	2
478	32976	2	26	1	1	2.8	2	2	2	1	1	2	96	96	0	1.9	2.4	1	2	2	2
479	32931	2	25	1	1	2	2	2	2	1	1	2	96	98	2	4.3	0.9	1	2	2	2
480	32999	2	39	1	2	3.5	2	2	2	1	1	2	99	98	1	1.4	3.2	2	2	2	2
481	32527	1	38	1	2	3.4	2	2	2	1	1	2	97	96	1	2.8	2.5	1	2	2	2
482	32520	2	33	1	2	2.5	2	2	2	1	1	2	96	96	0	1.6	4.6	1	2	2	2
483	32413	1	33	1	2	2.75	2	2	2	1	1	2	97	98	1	2.4	2.2	2	2	2	2
484	32930	2	31	1	2	2.9	2	2	2	1	1	2	97	98	1	1.5	1	1	2	2	2
485	32966	2	29	1	2	2.45	2	2	2	1	1	2	98	96	2	2.4	1.1	1	2	2	2
486	32719	2	29	1	2	3	2	2	2	1	1	2	100	98	2	1.4	1.7	1	2	2	2

487	33094	2	24	1	2	3.25	2	2	2	1	1	2	96	98	2	1.9	2.3	1	2	2	2
488	32684	2	24	1	2	3.2	2	2	2	1	1	2	100	100	0	1.8	1.1	1	2	2	2
489	32903	2	24	1	2	3.25	2	2	2	1	1	2	98	98	0	1.9	2	2	2	2	2
490	32783	1	26	1	2	3.1	2	2	2	1	1	2	97	98	1	2.4	1.2	2	2	2	2
491	33099	2	24	1	2	3.1	2	2	2	1	1	2	96	96	0	1.8	2.4	1	2	2	2
492	33121	1	24	1	2	4	2	2	2	1	1	2	97	97	0	4.6	1.4	2	2	2	2
493	33100	2	43	1	1	2.4	2	2	2	1	1	2	96	97	1	1.1	5.1	1	2	2	2
494	33154	2	36	1	1	2.75	2	2	2	1	1	2	96	98	2	2.7	2.3	1	2	2	2
495	32779	1	34	1	1	3.2	2	2	2	1	1	2	99	97	2	1.5	2	1	2	2	2
496	33205	1	34	1	1	2.6	2	2	2	1	1	2	96	96	0	1.8	1.1	1	2	2	2
497	33127	2	33	1	1	2.75	2	2	2	1	1	2	96	96	0	2.6	3.1	1	2	2	2
498	33107	1	32	1	1	3	2	2	2	1	1	2	96	96	0	1.9	3	2	2	2	2
499	33190	2	31	1	1	2.1	2	2	2	1	1	2	97	97	0	1.3	5.1	1	2	2	2
500	33280	1	27	1	1	2.25	2	2	2	1	1	2	98	96	2	2.6	1.5	2	2	2	2
501	33204	2	26	1	1	2.4	2	2	2	1	1	2	96	97	1	2.7	2.9	2	2	2	2
502	33089	2	24	1	1	3	2	2	2	1	1	2	98	99	1	1.7	1.6	1	2	2	2
503	33254	2	24	1	1	2.5	2	2	2	1	1	2	96	98	2	6.3	3.3	1	2	2	2
504	33234	1	24	1	1	2.4	2	2	2	1	1	2	98	100	2	1.8	1.3	1	2	2	2
505	33290	1	24	1	1	2.7	2	2	2	1	1	2	100	98	2	1.3	1.1	1	2	2	2
506	33005	1	24	1	1	3.6	2	2	2	1	1	2	98	98	0	1.3	2.1	1	2	2	2
507	33178	1	43	1	2	2.1	2	2	2	1	1	2	97	96	1	3.2	2.7	1	2	2	2
508	33109	2	42	1	2	3.7	2	2	2	1	1	2	98	98	0	2.4	1.2	1	2	2	2
509	33065	2	41	1	2	2.3	2	2	2	1	1	2	99	100	1	1.2	1.9	1	2	2	2
510	33187	1	41	1	2	3.3	2	2	2	1	1	2	98	99	1	2.7	2.1	1	2	2	2
511	33193	1	36	1	2	3.4	2	2	2	1	1	2	99	98	1	0.84	1.3	1	2	2	2
512	33158	2	38	1	2	3.5	2	2	2	1	1	2	96	97	1	1.8	2.6	2	2	2	2
513	33173	2	36	1	2	2.7	2	2	2	1	1	2	99	100	1	3.3	0.8	2	2	2	2
514	32675	2	34	1	2	2.9	2	2	2	1	1	2	99	99	0	1.1	3.4	1	2	2	2
515	32895	1	33	1	2	3	2	2	2	1	1	2	99	99	0	2.1	1.4	1	2	2	2
516	32543	1	32	1	2	3.6	2	2	2	1	1	2	96	96	0	1.8	2.4	1	2	2	2
517	33022	1	32	1	2	3	2	2	2	1	1	2	96	96	0	4	3.8	1	2	2	2
518	32955	1	31	1	2	2.6	2	2	2	1	1	2	99	100	1	0.84	0.85	1	2	2	2
519	33258	2	28	1	2	3	2	2	2	1	1	2	96	97	1	1.8	2.6	1	2	2	2
520	33271	2	26	1	2	2.75	2	2	2	1	1	2	98	100	2	2.8	1.1	1	2	2	2
521	32557	1	27	1	2	3.55	2	2	2	1	1	2	97	97	0	0.88	1.4	1	2	2	2
522	32961	2	24	1	2	3	2	2	2	1	1	2	98	97	1	4.2	3.5	1	2	2	2
523	33163	2	24	1	2	3.2	2	2	2	1	1	2	96	96	0	2.4	4.3	1	2	2	2
524	33252	1	24	1	2	3.2	2	2	2	1	1	2	96	96	0	2.5	2.4	1	2	2	2
525	33291	2	24	1	2	2.5	2	2	2	1	1	2	97	96	1	1.1	1.1	2	2	2	2
526	33185	1	43	1	1	2	2	2	2	1	1	2	96	96	0	1.2	5	1	2	2	2
527	33288	1	42	1	1	2.2	2	2	2	1	1	2	96	97	1	1.7	1.3	1	2	2	2

528	33123	2	40	1	1	3	2	2	2	1	1	2	96	96	0	1.1	2	2	2	2	2
529	33338	2	38	1	1	3.5	2	2	2	1	1	2	96	96	0	2	3.7	1	2	2	2
530	33180	1	36	1	1	3.25	2	2	2	1	1	2	99	98	1	1.5	1	1	2	2	2
531	32787	1	34	1	1	2.05	2	2	2	1	1	2	96	96	0	1.2	1.5	1	2	2	2
532	33345	2	28	1	1	2.5	2	2	2	1	1	2	97	97	0	2.2	4.2	1	2	2	2
533	33391	2	26	1	1	3.25	2	2	2	1	1	2	96	96	0	3.6	4.1	1	2	2	2
534	33206	1	24	1	1	3.7	2	2	2	1	1	2	97	98	1	3.9	1.7	1	2	2	2
535	33330	1	24	1	1	3.4	2	2	2	1	1	2	98	100	2	1.8	2.5	1	2	2	2
536	33429	2	24	1	1	3.6	2	2	2	1	1	2	98	96	2	1.7	1.6	1	2	2	2
537	33319	1	41	1	2	3	2	2	2	1	1	2	97	98	1	3	3.2	1	2	2	2
538	33305	1	41	1	2	2.5	2	2	2	1	1	2	98	97	1	0.86	0.94	1	2	2	2
539	33304	1	36	1	2	3.4	2	2	2	1	1	2	98	96	2	2	1.3	2	2	2	2
540	32792	2	32	1	2	2.9	2	2	2	1	1	2	97	96	1	4	4.4	1	2	2	2
541	33165	2	33	1	2	2.5	2	2	2	1	1	2	98	97	1	3.5	2.9	1	2	2	2
542	33103	2	33	1	2	2.6	2	2	2	1	1	2	99	98	1	1.6	2	1	2	2	2
543	33292	2	31	1	2	2.65	2	2	2	1	1	2	96	96	0	1.6	2.8	1	2	2	2
544	33149	1	31	1	2	3.3	2	2	2	1	1	2	97	97	0	1.6	2	1	2	2	2
545	33417	1	27	1	2	3.25	2	2	2	1	1	2	98	99	1	3.2	2	1	2	2	2
546	33355	2	27	1	2	3.5	2	2	2	1	1	2	99	99	0	1	1.5	2	2	2	2
547	33351	1	24	1	2	2.6	2	2	2	1	1	2	98	97	1	1.4	1	1	2	2	2
548	33420	2	24	1	2	3.25	2	2	2	1	1	2	98	100	2	1.8	1.6	1	2	2	2
549	33469	1	24	1	2	3.3	2	2	2	1	1	2	98	98	0	4	2.3	1	2	2	2
550	33396	2	24	1	2	3.85	2	2	2	1	1	2	98	96	2	2.2	2.6	1	2	2	2
551	33321	1	24	1	2	2.9	2	2	2	1	1	2	98	99	1	2.4	1.1	2	2	2	2
552	33108	1	24	1	2	2.9	2	2	2	1	1	2	96	97	1	7.4	3.8	1	2	2	2
553	33244	1	42	1	1	2.75	2	2	2	1	1	2	99	99	0	1.7	1.3	1	2	2	2
554	33481	1	42	1	1	2.25	2	2	2	1	1	2	98	98	0	1.6	1.8	1	2	2	2
555	33293	2	41	1	1	2.5	2	2	2	1	1	2	97	96	1	3	5.2	1	2	2	2
556	33451	1	40	1	1	2.25	2	2	2	1	1	2	97	97	0	1.9	2.1	1	2	2	2
557	33469	1	39	1	1	2.75	2	2	2	1	1	2	96	96	0	1.2	4.9	1	2	2	2
558	33398	1	38	1	1	2.8	2	2	2	1	1	2	98	97	1	4.9	1.5	1	2	2	2
559	33499	2	37	1	1	2.6	2	2	2	1	1	2	98	96	2	2.2	1.8	1	2	2	2
560	33502	1	35	1	1	2.5	2	2	2	1	1	2	98	98	0	2.1	1.5	1	2	2	2
561	33498	1	30	1	1	2.25	2	2	2	1	1	2	98	100	2	1.9	1.2	1	2	2	2
562	33501	1	30	1	1	2.9	2	2	2	1	1	2	96	96	0	4.2	1.8	1	2	2	2
563	33379	1	30	1	1	2.8	2	2	2	1	1	2	98	97	1	1.8	1.8	2	2	2	2
564	33584	2	24	1	1	1.75	2	2	2	1	1	2	99	99	0	1	0.95	1	2	2	2
565	32791	2	42	1	2	3.05	2	2	2	1	1	2	96	99	3	2.6	1	1	2	2	2
566	32265	2	41	1	2	2.5	2	2	2	1	1	2	97	96	1	1	1.3	1	2	2	2
567	33307	2	39	1	2	3.4	2	2	2	1	1	2	98	98	0	2	2.7	1	2	2	2
568	32902	1	33	1	2	2.3	2	2	2	1	1	2	100	100	0	1.2	0.88	1	2	2	2

569	33007	1	33	1	2	2.7	2	2	2	1	1	2	100	100	0	1.1	2.2	1	2	2	2
570	33240	2	31	1	2	3	2	2	2	1	1	2	96	96	0	2.1	3.8	1	2	2	2
571	32669	2	32	1	2	3.2	2	2	2	1	1	2	96	97	1	5.1	3.7	1	2	2	2
572	33152	2	32	1	2	2.75	2	2	2	1	1	2	97	97	0	3.2	4.8	1	2	2	2
573	33531	2	26	1	2	3.4	2	2	2	1	1	2	99	98	1	1.6	1.3	1	2	2	2
574	33547	1	26	1	2	3.2	2	2	2	1	1	2	96	97	1	1.8	1.2	1	2	2	2
575	33587	1	24	1	2	3.1	2	2	2	1	1	2	96	97	1	7.6	4.5	1	2	2	2
576	33625	2	37	1	2	3.1	2	2	2	1	1	2	98	100	2	0.84	0.79	1	2	2	2
577	33626	1	37	1	2	2.6	2	2	2	1	1	2	99	98	1	1.7	1.2	1	2	2	2
578	33543	1	36	1	2	3.1	2	2	2	1	1	2	96	98	2	1.4	1.6	1	2	2	2
579	33627	2	34	1	2	3.5	2	2	2	1	1	2	99	98	1	1.9	2.8	2	2	2	2
580	33608	1	31	1	2	2.5	2	2	2	1	1	2	97	97	0	2.8	1.8	1	2	2	2
581	33151	1	33	1	2	2.1	2	2	2	1	1	2	96	98	2	3.1	2.7	1	2	2	2
582	33611	1	33	1	2	3.9	2	2	2	1	1	2	98	96	2	1.8	3.6	1	2	2	2
583	33648	1	29	1	2	2.75	2	2	2	1	1	2	96	96	0	5.5	3.6	1	2	2	2
584	33412	2	28	1	2	2.75	2	2	2	1	1	2	96	97	1	0.98	0.82	1	2	2	2
585	33640	1	26	1	2	4	2	2	2	1	1	2	100	98	2	0.88	0.97	2	2	2	2
586	33385	2	26	1	2	2.75	2	2	2	1	1	2	96	97	1	2.7	1.8	1	2	2	2
587	33598	2	27	1	2	2.75	2	2	2	1	1	2	98	99	1	2.6	2.4	1	2	2	2
588	33659	2	25	1	2	2.25	2	2	2	1	1	2	99	98	1	2.9	1.7	1	2	2	2
589	33432	1	25	1	2	3.75	2	2	2	1	1	2	97	96	1	3.1	1.3	1	2	2	2
590	33680	1	24	1	2	2.75	2	2	2	1	1	2	99	99	0	1.9	1.6	1	2	2	2
591	33546	1	24	1	2	3.4	2	2	2	1	1	2	98	97	1	1.8	3.4	1	2	2	2
592	33578	1	24	1	2	3.75	2	2	2	1	1	2	96	96	0	2.4	2.7	1	2	2	2
593	33034	2	24	1	2	2.75	2	2	2	1	1	2	97	96	1	1.8	1.7	1	2	2	2
594	33435	2	24	1	2	2.75	2	2	2	1	1	2	96	96	0	1.6	2.3	1	2	2	2
595	33535	2	24	1	2	3.6	2	2	2	1	1	2	99	97	2	1.2	2.4	1	2	2	2
596	33449	1	43	1	1	3.2	2	2	2	1	1	2	99	97	2	4.2	1	1	2	2	2
597	33588	1	39	1	1	3	2	2	2	1	1	2	97	99	2	1.7	2.1	1	2	2	2
598	33604	2	38	1	1	2.3	2	2	2	1	1	2	96	98	2	2.8	1.8	2	2	2	2
599	33526	1	34	1	1	2.7	2	2	2	1	1	2	97	96	1	1.6	2.5	1	2	2	2
600	33419	2	34	1	1	3.2	2	2	2	1	1	2	98	99	1	2.2	2.7	1	2	2	2
601	33624	2	30	1	1	2.75	2	2	2	1	1	2	96	96	0	2.6	6.3	1	2	2	2
602	33641	2	30	1	1	2.5	2	2	2	1	1	2	96	98	2	5.5	2	2	2	2	2
603	33674	1	27	1	1	2.5	2	2	2	1	1	2	100	99	1	0.86	2.1	1	2	2	2
604	33602	2	24	1	1	3	2	2	2	1	1	2	97	98	1	3.5	2.3	1	2	2	2
605	33585	1	24	1	1	2.8	2	2	2	1	1	2	99	98	1	2.4	1.1	1	2	2	2
606	33690	2	24	1	1	2.5	2	2	2	1	1	2	98	96	2	1.4	1.8	1	2	2	2
607	33430	1	24	1	1	2.5	2	2	2	1	1	2	97	98	1	1.4	2.7	1	2	2	2
608	33784	1	43	1	4	3	2	2	2	1	1	2	98	96	2	1.7	1	1	2	2	2
609	33773	1	42	1	1	2.25	2	2	2	1	1	2	96	95	1	0.9	1	1	2	2	2

610	33867	2	43	1	1	2.35	2	2	2	1	1	2	97	97	0	2.1	2	1	2	2	2
611	33810	1	44	1	2	3.25	2	2	2	1	1	2	96	98	2	0.9	1.1	1	2	2	2
612	33866	2	42	1	2	2.3	2	2	2	1	1	2	95	97	2	1.2	1.4	1	2	2	2
613	33851	2	40	1	2	3.1	2	2	2	1	1	2	96	97	1	2.3	2.3	2	2	2	2
614	33846	1	40	1	2	3.25	2	2	2	1	1	2	99	100	1	2.6	3.2	1	2	2	2
615	33884	1	38	1	1	2.5	2	2	2	1	1	2	100	99	1	0.87	1.5	1	2	2	2
616	33723	2	40	1	1	2.25	2	2	2	1	1	2	98	99	1	3.4	3.6	1	2	2	2
617	33740	2	37	1	2	3.05	2	2	2	1	1	2	97	98	1	2.4	2.6	1	2	2	2
618	33862	2	37	1	2	2.75	2	2	2	1	1	2	95	97	2	4.2	3.4	1	2	2	2
619	33814	2	37	1	1	2.3	2	2	2	1	1	2	98	99	1	2.7	3.4	1	2	2	2
620	33724	1	35	1	2	2.25	2	2	2	1	1	2	100	99	1	1.5	1.6	1	2	2	2
621	33852	1	35	1	1	2.6	2	2	2	1	1	2	98	97	1	2.3	1.7	1	2	2	2
622	33883	2	35	1	1	2.75	2	2	2	1	1	2	99	97	2	3.1	4.3	1	2	2	2
623	33891	1	34	1	1	2.6	2	2	2	1	1	2	96	96	0	1.3	1.6	1	2	2	2
624	33900	1	30	2	1	2.5	2	2	2	1	1	1	92	90	2	1.5	1.4	1	2	1	1
625	33698	2	32	1	2	2	2	2	2	1	1	2	97	96	1	2	1.5	1	2	2	2
626	33892	2	32	1	2	3.75	2	2	2	1	1	2	98	99	1	1.3	1	1	2	2	2
627	32901	2	31	1	1	2.75	2	2	2	1	1	2	100	100	0	2.8	2.1	1	2	2	2
628	33556	2	33	1	2	3	2	2	2	1	1	2	97	96	1	3	2.8	1	2	2	2
629	33772	2	31	1	2	3	2	2	2	1	1	2	98	99	1	1.8	1.8	1	2	2	2
630	33913	1	28	1	1	2.5	2	2	2	1	1	2	96	95	1	2	1.5	1	2	2	2
631	33893	2	28	1	1	2.6	2	2	2	1	1	2	99	97	2	1.5	1.7	2	2	2	2
632	32890	1	27	1	2	3	2	2	2	1	1	2	97	98	1	2	1.3	2	2	2	2
633	33856	1	27	1	2	3.5	2	2	2	1	1	2	95	96	1	1.3	1.6	1	2	2	2
634	33921	1	25	1	1	3.5	2	2	2	1	1	2	98	98	0	1.3	1.7	1	2	2	2
635	33615	1	28	1	2	2	2	2	2	1	1	2	99	97	2	1.7	2.8	1	2	2	2
636	33821	2	36	1	1	2	2	2	2	1	1	2	98	95	3	3.4	2.9	1	2	2	2
637	33850	2	26	1	2	2.75	2	2	2	1	1	2	99	97	2	1.7	2.9	1	2	2	2
638	33714	1	30	1	2	3.65	2	2	2	1	1	2	97	95	2	3.2	3	1	2	2	2
639	33928	2	24	1	2	3.5	2	2	2	1	1	2	95	96	1	2.5	2	1	2	2	2
640	33903	2	24	1	2	3.6	2	2	2	1	1	2	98	97	1	4.5	3.2	1	2	2	2
641	33912	1	26	1	2	3.2	2	2	2	1	1	2	99	100	1	1.4	0.9	1	2	2	2
642	33553	1	25	1	2	3.75	2	2	2	1	1	2	98	97	1	2.3	1.4	1	2	2	2
643	33399	1	27	1	2	3.2	2	2	2	1	1	2	95	96	1	1.7	1.2	2	2	2	2
644	33874	2	25	1	2	3.5	2	2	2	1	1	2	98	97	1	2.3	1.4	1	2	2	2
645	33895	1	27	1	2	2.75	2	2	2	1	1	2	96	95	1	1.7	2	1	2	2	2
646	33671	1	24	1	2	4.1	2	2	2	1	1	2	97	98	1	1.2	0.9	1	2	2	2
647	33582	1	24	1	2	3.6	2	2	2	1	1	2	95	95	0	1.2	1	1	2	2	2
648	33908	2	24	1	2	3.15	2	2	2	1	1	2	98	97	1	2.3	1.8	1	2	2	2
649	33673	2	24	1	2	3.1	2	2	2	1	1	2	99	100	1	1.3	2.4	1	2	2	2
650	33686	2	24	1	2	2.5	2	2	2	1	1	2	97	96	1	1.3	1.5	1	2	2	2

651	33686	1	24	1	2	2.2	2	2	2	1	1	2	96	95	1	2	1.8	1	2	2	2
652	34510	1	42	1	1	3	2	2	2	1	1	2	98	99	1	2.6	0.95	1	2	2	2
653	35206	1	43	1	3	2.2	2	2	2	1	1	2	96	98	2	2	1.7	1	2	2	2
654	32734	1	38	1	1	2.75	2	2	2	1	1	2	97	99	2	2.3	2.5	1	2	2	2
655	35222	2	38	1	1	3.25	2	2	2	1	1	2	98	97	1	5.4	4.6	1	2	2	2
656	35059	2	34	1	1	3.2	2	2	2	1	1	2	97	96	1	1.2	0.83	1	2	2	2
657	35229	2	34	1	1	3.3	2	2	2	1	1	2	97	96	1	1.6	2.1	2	2	2	2
658	34459	2	31	1	4	2.75	2	2	2	1	1	2	96	99	3	1.7	2.8	1	2	2	2
659	35232	2	33	1	1	2.9	2	2	2	1	1	2	96	97	1	4.4	2.6	1	2	2	2
660	35245	1	33	1	1	2.8	2	2	2	1	1	2	98	100	2	0.83	1	1	2	2	2
661	35053	1	28	1	1	2.8	2	2	2	1	1	2	96	96	0	1.8	1.5	1	2	2	2
662	35195	2	24	1	1	2.3	2	2	2	1	1	2	99	99	0	1.2	1.1	1	2	2	2
663	35145	2	24	1	1	2.2	2	2	2	1	1	2	99	96	3	4.7	2.7	1	2	2	2
664	35312	2	24	1	1	2.25	2	2	2	1	1	2	97	98	1	3.1	2.3	1	2	2	2
665	35333	1	24	1	1	2.75	2	2	2	1	1	2	96	96	0	2.3	4	1	2	2	2
666	35214	1	24	1	1	2.2	2	2	2	1	1	2	96	97	1	2.5	4.8	1	2	2	2
667	35166	2	24	1	1	2.75	2	2	2	1	1	2	98	99	1	6.2	2.5	1	2	2	2
668	36505	1	41	1	5	3.5	2	2	2	1	1	2	96	97	1	2.1	2.9	1	2	2	2
669	36474	1	37	1	1	3.2	2	2	2	1	1	2	98	98	0	3.7	4.8	1	2	2	2
670	36488	2	36	1	1	3.1	2	2	2	1	1	2	97	99	2	6.7	6.6	1	2	2	2
671	36493	1	33	1	1	3.4	2	2	2	1	1	2	97	97	0	2.2	2.5	1	2	2	2
672	36507	1	31	1	1	3.25	2	2	2	1	1	2	98	99	1	1.6	3.2	1	2	2	2
673	36551	1	26	1	1	2.6	2	2	2	1	1	2	98	100	2	0.8	1.4	1	2	2	2
674	36393	1	24	1	1	3	2	2	2	1	1	2	98	99	1	4.1	1.5	2	2	2	2
675	36385	1	24	1	4	2.25	2	2	2	1	1	2	98	98	0	2	2.5	1	2	2	2
676	36512	1	24	1	1	3.5	2	2	2	1	1	2	97	99	2	3.7	2.3	1	2	2	2
677	36595	2	24	1	1	2	2	2	2	1	1	2	98	99	1	2.4	1.7	2	2	2	2
678	36318	2	43	1	2	3.2	2	2	2	1	1	2	100	100	0	1.4	3.5	1	2	2	2
679	36858	2	37	1	2	2.75	2	2	2	1	1	2	100	99	1	1.7	2	1	2	2	2
680	36886	2	33	1	2	3.5	2	2	2	1	1	2	99	98	1	2	1.9	1	2	2	2
681	36889	1	31	1	2	3.1	2	2	2	1	1	2	100	98	2	1.1	1.1	1	2	2	2
682	36946	2	24	1	2	2.75	2	2	2	1	1	2	98	100	2	2.8	2.6	1	2	2	2
683	36873	2	24	1	2	2.9	2	2	2	1	1	2	99	96	3	1.3	4.1	1	2	2	2
684	38855	1	43	1	1	2.5	2	2	2	1	1	2	98	96	2	1.4	1.5	1	2	2	2
685	38885	2	39	1	1	3.25	2	2	2	1	1	2	96	97	1	1.3	0.8	1	2	2	2
686	38869	2	35	1	4	3	2	2	2	1	1	2	100	99	1	1.2	1.2	1	2	2	2
687	38876	2	33	1	1	2	2	2	2	1	1	2	100	100	0	1.7	1.4	1	2	2	2
688	38870	1	32	1	4	2.4	2	2	2	1	1	2	99	99	0	1.1	3.1	1	2	2	2
689	38832	2	28	1	1	2.4	2	2	2	1	1	2	99	99	0	1.2	1.2	2	2	2	2
690	38819	2	27	1	1	2.2	2	2	2	1	1	2	100	100	0	4.9	2.3	1	2	2	2
691	38900	1	26	1	1	2.55	2	2	2	1	1	2	97	96	1	1.1	1.3	1	2	2	2

692	38897	2	24	1	4	3.25	2	2	2	1	1	2	100	100	0	1.8	1.5	1	2	2	2
693	562	1	27	1	1	3.75	2	2	2	1	1	2	99	99	0	3.4	3.6	1	2	2	2
694	609	2	25	1	1	3.1	2	2	2	1	1	2	97	97	0	2.7	1.1	2	2	2	2
695	669	2	25	1	1	2.9	2	2	2	1	1	2	96	96	0	4.2	4.9	1	2	2	2
696	643	1	24	1	1	3.25	2	2	2	1	1	2	96	96	0	1.8	2.4	1	2	2	2
697	699	1	24	1	1	3.1	2	2	2	1	1	2	96	98	2	1	1.9	1	2	2	2
698	721	2	24	1	1	2.6	2	2	2	1	1	2	96	97	1	1.7	1.5	1	2	2	2
699	39411	2	43	1	1	2.5	2	2	2	1	1	2	96	97	1	2.9	2.1	1	2	2	2
700	556	1	43	1	1	3.5	2	2	2	1	1	2	96	96	0	1.4	1.2	1	2	2	2
701	576	1	41	1	1	2.9	2	2	2	1	1	2	96	98	2	1.7	1.4	2	2	2	2
702	734	2	41	1	1	2.25	2	2	2	1	1	2	97	98	1	4.3	1	1	2	2	2
703	712	2	38	1	1	3	2	2	2	1	1	2	98	99	1	4.6	2.4	1	2	2	2
704	752	2	31	1	1	3	2	2	2	1	1	2	98	97	1	1.9	1.8	1	2	2	2
705	768	1	28	1	1	2.5	2	2	2	1	1	2	98	96	2	1.6	2.1	1	2	2	2
706	788	1	24	1	1	2.3	2	2	2	1	1	2	98	100	2	3.3	3.4	1	2	2	2
707	245	2	72	1	2	2.6	2	2	2	1	1	2	97	99	2	2.8	0.9 1	1	2	2	2
708	886	1	72	2	1	2.6	2	2	2	1	1	2	99	99	0	2.1	0.9	2	2	2	2
709	979	2	72	1	2	2.95	2	2	2	1	1	2	98	99	1	1.8	2.7	1	2	2	2
710	978	1	72	1	2	2.85	2	2	2	1	1	2	96	97	1	2.1	4.2	1	2	2	2
711	977	2	72	1	2	3.35	2	2	2	1	1	2	97	97	0	3.9	1.4	1	2	2	2
712	1006	2	57	1	2	2.75	2	2	2	1	1	2	96	97	1	2.2	5.4	1	2	2	2
713	988	1	55	1	2	2.6	2	2	2	1	1	2	98	99	1	1.3	1.7	1	2	2	2
714	1014	1	54	1	2	3.1	2	2	2	1	1	2	97	99	2	2.2	3.1	1	2	2	2
715	1038	1	51	1	2	2.9	2	2	2	1	1	2	96	98	2	3.8	2.9	1	2	2	2
716	1063	1	47	1	2	2.5	2	2	2	1	1	2	98	99	1	1	1.4	1	2	2	2
717	1033	1	47	1	2	2.85	2	2	2	1	1	2	99	99	0	0.9	1.2	1	2	2	2
718	972	2	45	1	2	2.65	2	2	2	1	1	2	100	100	0	2.3	1.4	1	2	2	2
719	2162	1	43	1	2	3.2	2	2	2	1	1	2	98	97	1	2.4	3.1	1	2	2	2
720	2089	1	41	1	1	2.5	2	2	2	1	1	2	99	97	2	1.3	1.5	1	2	2	2
721	2191	2	37	1	1	3.1	2	2	2	1	1	2	98	96	2	2	1.5	1	2	2	2
722	2184	2	39	1	1	2.6	2	2	2	1	1	2	95	96	1	0.9	1.2	1	2	2	2
723	2192	1	37	1	2	3.1	2	2	2	1	1	2	97	97	0	1.3	1.4	1	2	2	2
724	2130	2	36	1	1	3.2	2	2	2	1	1	2	99	98	1	1	2.3	1	2	2	2
725	2198	2	34	1	1	3.3	2	2	2	1	1	2	97	95	2	2.3	3	1	2	2	2
726	1679	1	34	1	2	2.4	2	2	2	1	1	2	96	95	1	1.3	2.2	2	2	2	2
727	1106	1	34	1	2	2	2	2	2	1	1	2	98	100	2	3.4	3	1	2	2	2
728	2179	1	33	1	2	2.2	2	2	2	1	1	2	100	100	0	2	3.8	1	2	2	2
729	1875	2	31	1	1	2.95	2	2	2	1	1	2	98	95	3	1	2.3	1	2	2	2
730	2217	1	31	1	2	2.85	2	2	2	1	1	2	99	100	1	2.1	3.4	1	2	2	2
731	2256	2	27	1	1	2.75	2	2	2	1	1	2	97	98	1	1.6	2.1	1	2	2	2
732	2264	2	27	1	1	2.25	2	2	2	1	1	2	98	99	1	2	3.6	1	2	2	2

733	2246	2	28	1	2	3.25	2	2	2	1	1	2	99	100	1	2	3	1	2	2	2
734	2259	2	26	1	2	2.75	2	2	2	1	1	2	97	95	2	3.1	1.8	1	2	2	2
735	2257	1	24	1	2	3.25	2	2	2	1	1	2	99	100	1	2.1	2.3	1	2	2	2
736	2180	1	24	1	1	2.5	2	2	2	1	1	2	99	99	0	2.3	3	1	2	2	2
737	2272	1	24	1	2	2.6	2	2	2	1	1	2	98	97	1	2	3	1	2	2	2
738	2258	1	24	1	1	3.75	2	2	2	1	1	2	100	97	3	1.2	3.2	1	2	2	2
739	2151	2	34	1	4	2.25	2	2	2	1	1	2	100	98	2	5.4	4.2	1	2	2	2
740	2300	2	34	1	1	2.55	2	2	2	1	1	2	99	98	1	1.8	1.5	1	2	2	2
741	2139	2	29	1	1	3.6	2	2	2	1	1	2	97	95	2	2.3	6.9	1	2	2	2
742	2124	1	28	1	1	2.6	2	2	2	1	1	2	100	99	1	1.5	1.2	2	2	2	2
743	2299	1	27	1	1	3.1	2	2	2	1	1	2	98	99	1	2.9	1.1	1	2	2	2
744	2318	2	24	1	1	3.2	2	2	2	1	1	2	99	98	1	1.9	2.2	1	2	2	2
745	2326	1	24	1	1	2.4	2	2	2	1	1	2	97	99	2	1.5	3.3	1	2	2	2
746	2279	1	34	1	2	3.75	2	2	2	1	1	2	99	98	1	2.1	2	1	2	2	2
747	2025	1	32	1	2	3.7	2	2	2	1	1	2	99	97	2	3.6	3.7	1	2	2	2
748	2270	2	33	1	2	3.3	2	2	2	1	1	2	96	97	1	1.5	6.4	1	2	2	2
749	2308	1	31	1	2	3.5	2	2	2	1	1	2	97	99	2	1.1	3.7	1	2	2	2
750	2249	2	28	1	2	3.1	2	2	2	1	1	2	99	99	0	2.1	2.3	1	2	2	2
751	2314	1	27	1	2	3.5	2	2	2	1	1	2	98	98	0	1.5	1.2	1	2	2	2
752	2317	1	29	1	2	3.26	2	2	2	1	1	2	98	97	1	1.2	1.5	1	2	2	2
753	2267	2	28	1	2	3.5	2	2	2	1	1	2	99	100	1	0.9	1.4	1	2	2	2
754	2154	1	26	1	2	3.4	2	2	2	1	1	2	99	98	1	1.4	1.3	1	2	2	2
755	2330	1	24	1	2	3.05	2	2	2	1	1	2	97	99	2	4.5	4.2	1	2	2	2
756	2322	1	24	1	2	2.75	2	2	2	1	1	2	100	99	1	1.2	1.5	2	2	2	2
757	2367	1	36	1	1	3.4	2	2	2	1	1	2	98	100	2	1.9	1.9	1	2	2	2
758	2372	1	36	1	1	3	2	2	2	1	1	2	97	100	3	1.1	2.4	1	2	2	2
759	2365	1	34	1	1	2.5	2	2	2	1	1	2	95	98	3	0.85	2.3	1	2	2	2
760	2430	2	24	1	1	2.5	2	2	2	1	1	2	96	97	1	1	3.9	1	2	2	2
761	2439	1	24	1	1	3.2	2	2	2	1	1	2	99	98	1	1.3	0.91	1	2	2	2
762	2244	2	36	1	2	2.9	2	2	2	1	1	2	99	98	1	2.1	2.2	1	2	2	2
763	2331	1	36	1	2	3.25	2	2	2	1	1	2	98	98	0	1.3	1.2	1	2	2	2
764	2245	1	36	1	2	3.45	2	2	2	1	1	2	96	98	2	2.3	1.6	1	2	2	2
765	1947	1	34	1	2	4.25	2	2	2	1	1	2	97	98	1	1.7	2.7	1	2	2	2
766	1628	2	34	1	2	1.9	2	2	2	1	1	1	98	100	2	1.1	1.4	1	2	1	2
767	1781	2	33	1	2	2.6	2	2	2	1	1	2	97	99	2	1.5	1.5	1	2	2	2
768	2027	1	32	1	2	3.5	2	2	2	1	1	2	96	97	1	1.9	2	1	2	2	2
769	1575	2	32	1	2	2.7	2	2	2	1	1	2	99	98	1	3.7	1.1	1	2	2	2
770	1874	2	31	1	2	3.25	2	2	2	1	1	2	99	98	1	1.6	1.2	1	2	2	2
771	2290	2	31	1	2	3.2	2	2	2	1	1	2	97	95	2	1.4	1.6	1	2	2	2
772	2275	2	25	1	2	3.1	2	2	2	1	1	2	99	97	2	1.5	2	1	2	2	2
773	2347	2	24	1	2	3	2	2	2	1	1	2	99	100	1	1.7	1.1	2	2	2	2

774	2424	1	24	1	2	2.75	2	2	2	1	1	2	97	98	1	1.2	1.7	1	2	2	2
775	1873	2	24	1	2	3.5	2	2	2	1	1	2	99	98	1	1.2	0.9	1	2	2	2
776	2262	1	28	1	2	3.2	2	2	2	1	1	2	99	100	1	1.5	1.7	1	2	2	2
777	2357	2	24	1	2	2.55	2	2	2	1	1	2	97	99	2	1.2	1.1	1	2	2	2
778	2474	1	24	1	1	3.5	2	2	2	1	1	2	96	95	1	3.1	1.6	1	2	2	2
779	2433	1	38	1	2	3.25	2	2	2	1	1	2	96	98	2	1	0.73	1	2	2	2
780	2455	1	36	1	2	3	2	2	2	1	1	2	99	97	2	3.3	4.3	1	2	2	2
781	2446	1	33	1	2	3.3	2	2	2	1	1	2	96	96	0	4.3	1.9	1	2	2	2
782	2456	1	33	1	2	2.55	2	2	2	1	1	2	98	100	2	4	1.6	1	2	2	2
783	2466	2	32	1	2	2.6	2	2	2	1	1	2	97	97	0	1.8	4.4	1	2	2	2
784	1729	2	34	1	2	2	2	2	2	1	1	2	98	100	2	1.1	1.6	1	2	2	2
785	1123	1	32	1	2	2.5	2	2	2	1	1	2	98	98	0	0.91	1.1	1	2	2	2
786	2015	2	31	1	2	3.5	2	2	2	1	1	2	97	97	0	1.3	2.1	2	2	2	2
787	2477	2	29	1	2	2.7	2	2	2	1	1	2	98	99	1	2.8	1.3	1	2	2	2
788	263	1	41	1	1	2.25	2	2	2	1	1	2	99	97	2	1.6	1.5	1	2	2	2
789	2436	1	35	1	5	3.5	2	2	2	1	1	2	96	98	2	3.6	2.9	1	2	2	2
790	2539	2	31	1	1	2.9	2	2	2	1	1	2	98	100	2	1.9	1.4	1	2	2	2
791	2570	2	33	1	1	2.5	2	2	2	1	1	2	98	97	1	1.3	1.7	1	2	2	2
792	2544	1	24	1	1	2.25	2	2	2	1	1	2	97	98	1	1.3	1.5	1	2	2	2
793	2573	2	31	1	1	2.7	2	2	2	1	1	2	98	100	2	0.98	1.4	1	2	2	2
794	2524	2	42	1	2	3	2	2	2	1	1	2	98	98	0	1.4	2.2	1	2	2	2
795	2146	2	39	1	2	2.95	2	2	2	1	1	2	98	96	2	1.1	4.5	1	2	2	2
796	2528	1	34	1	2	3	2	2	2	1	1	2	99	98	1	1.2	2.4	1	2	2	2
797	2472	1	33	1	2	3.8	2	2	2	1	1	2	99	99	0	1.6	2.2	1	2	2	2
798	2521	1	34	1	2	3	2	2	2	1	1	2	98	99	1	1.7	1.4	1	2	2	2
799	2404	1	31	1	2	3.6	2	2	2	1	1	2	97	98	1	2.5	1.4	1	2	2	2
800	2506	1	28	1	2	3.5	2	2	2	1	1	2	97	98	1	1.8	1.9	1	2	2	2
801	2549	1	27	1	2	3.75	2	2	2	1	1	2	100	100	0	1.2	1	1	2	2	2
802	2548	1	24	1	2	2.75	2	2	2	1	1	2	95	98	3	2.4	1.4	1	2	2	2
803	2554	2	26	1	2	2.9	2	2	2	1	1	2	97	98	1	1.4	3.5	1	2	2	2
804	2513	2	24	1	2	2.75	2	2	2	1	1	2	98	97	1	2.4	4.6	1	2	2	2
805	2581	1	42	1	1	2.7	2	2	2	1	1	2	96	98	2	6.5	3.4	1	2	2	2
806	2537	2	44	1	1	3	2	2	2	1	1	2	98	99	1	1	1.9	1	2	2	2
807	2591	2	36	1	1	2.25	2	2	2	1	1	2	95	95	0	3.3	2.7	1	2	2	2
808	2566	1	33	1	1	3	2	2	2	1	1	2	99	99	0	4.1	0.81	2	2	2	2
809	2620	1	27	1	1	2.9	2	2	2	1	1	2	96	98	2	2.8	3.5	1	2	2	2
810	2633	2	25	1	1	2.75	2	2	2	1	1	2	98	100	2	2.9	1.3	1	2	2	2
811	2578	2	38	1	2	3	2	2	2	1	1	2	97	98	1	2.8	4.4	1	2	2	2
812	2136	1	35	1	2	3.3	2	2	2	1	1	2	98	98	0	7.7	3.1	1	2	2	2
813	1560	1	35	1	2	2.7	2	2	2	1	1	2	97	98	1	4.1	3	1	2	2	2
814	2583	2	34	1	2	2.65	2	2	2	1	1	2	98	100	2	1.7	2.8	1	2	2	2

815	2522	1	30	1	2	3.25	2	2	2	1	1	2	98	99	1	1.9	1.8	1	2	2	2
816	1791	1	29	1	2	2.65	2	2	2	1	1	2	98	99	1	2.1	3.2	1	2	2	2
817	2611	1	30	1	2	3.29	2	2	2	1	1	2	98	100	2	2.1	2.1	1	2	2	2
818	2649	2	26	1	2	2.5	2	2	2	1	1	2	98	97	1	0.86	2.4	1	2	2	2
819	2642	2	24	1	2	2.6	2	2	2	1	1	2	100	98	2	1.2	0.92	1	2	2	2
820	2655	2	24	1	2	2.9	2	2	2	1	1	2	98	99	1	1.5	2.7	1	2	2	2
821	2635	2	25	1	2	3.6	2	2	2	1	1	2	98	98	0	1.5	4.2	1	2	2	2
822	2641	2	26	1	2	3.25	2	2	2	1	1	2	99	100	1	1.9	1.8	1	2	2	2
823	2686	2	34	1	4	3	2	2	2	1	1	2	99	99	0	4.5	1.5	2	2	2	2
824	2684	1	32	1	1	3.25	2	2	2	1	1	2	98	99	1	1.5	1.1	1	2	2	2
825	2669	1	30	1	1	2.6	2	2	2	1	1	2	97	99	2	3.8	1.3	1	2	2	2
826	2678	1	26	1	1	3	2	2	2	1	1	2	98	99	1	1.2	1.1	1	2	2	2
827	2535	1	24	1	1	2.5	2	2	2	1	1	2	97	100	3	5	0.8	1	2	2	2
828	2247	2	32	1	2	3.15	2	2	2	1	1	2	99	99	0	2.2	2.3	1	2	2	2
829	2625	1	30	1	2	3.25	2	2	2	1	1	2	99	99	0	1.4	2.9	1	2	2	2
830	2632	1	24	1	1	3.2	2	2	2	1	1	2	98	98	0	4.3	3.9	1	2	2	2
831	2740	2	24	1	1	2.9	2	2	2	1	1	2	95	98	3	5	1.6	1	2	2	2
832	2783	2	72	1	1	1.75	2	2	2	1	1	2	97	98	1	2.6	1.2	1	2	2	2
833	2713	1	70	1	2	3.25	2	2	2	1	1	2	96	98	2	3.5	1	1	2	2	2
834	2739	1	72	1	2	3.25	2	2	2	1	1	2	96	97	1	2.5	5.2	1	2	2	2
835	2750	2	70	1	2	2.9	2	2	2	1	1	2	98	97	1	2.4	3.3	1	2	2	2
836	2723	1	70	1	2	3	2	2	2	1	1	2	97	100	3	1.5	2.6	1	2	2	2
837	2741	2	70	1	2	2.9	2	2	2	1	1	2	100	99	1	1.5	2.7	2	2	2	2
838	2725	1	70	1	2	2.9	2	2	2	1	1	2	97	96	1	1.5	2.4	1	2	2	2
839	2705	1	72	1	2	3.2	2	2	2	1	1	2	97	100	3	5.5	2.1	1	2	2	2
840	2763	1	72	1	2	3.3	2	2	2	1	1	2	98	98	0	2.2	1.3	1	2	2	2
841	2475	1	72	1	2	2.9	2	2	2	1	1	2	97	97	0	1.1	3.3	1	2	2	2
842	2793	2	72	1	2	2.6	2	2	2	1	1	2	97	99	2	0.96	2.1	1	2	2	2
843	2826	1	72	1	2	2.5	2	2	2	1	1	2	95	97	2	3.6	2.5	2	2	2	2
844	2802	2	72	1	2	3	2	2	2	1	1	2	99	97	2	1.1	1.1	1	2	2	2
845	2796	2	72	1	2	2.9	2	2	2	1	1	2	97	100	3	2.2	1.6	1	2	2	2
846	2830	1	46	1	1	2.8	2	2	2	1	1	2	98	100	2	4.1	4.9	1	2	2	2
847	2856	1	46	1	1	3	2	2	2	1	1	2	98	97	1	4.1	4.1	1	2	2	2
848	2810	2	43	1	1	2.75	2	2	2	1	1	2	98	96	2	4.3	4.3	1	2	2	2
849	2801	2	72	1	2	3.5	2	2	2	1	1	2	97	97	0	2.8	1.4	1	2	2	2
850	2840	2	72	1	2	2.2	2	2	2	1	1	2	96	98	2	1.3	0.8	2	2	2	2
851	2822	1	70	1	2	3	2	2	2	1	1	2	98	98	0	1.9	3.7	1	2	2	2
852	2885	1	70	1	2	3.4	2	2	2	1	1	2	97	96	1	1	1.1	1	2	2	2
853	2881	2	71	1	2	2.75	2	2	2	1	1	2	95	97	2	2.1	1.1	1	2	2	2
854	2155	1	72	1	2	2.9	2	2	2	1	1	2	98	99	1	2.1	3.2	1	2	2	2
855	2903	1	70	1	2	3.4	2	2	2	1	1	2	100	100	0	1.2	0.9	1	2	2	2

856	2898	1	72	1	2	2.9	2	2	2	1	1	2	98	99	1	2.3	0.82	1	1	2	2
857	2845	1	70	1	2	3	2	2	2	1	1	2	98	98	0	1.2	2.7	1	2	2	2
858	2939	1	25	1	1	3.4	2	2	2	1	1	2	98	97	1	6.5	12	1	2	2	2
859	2954	2	55	1	1	2.8	2	2	2	1	1	2	96	98	2	2.1	1.1	1	2	2	2
860	2947	1	24	1	1	2.8	2	2	2	1	1	2	100	100	0	3.6	1.2	2	2	2	2
861	3016	2	24	1	1	2	2	2	2	1	1	2	98	97	1	1.5	3.4	1	2	2	2
862	2987	2	47	1	1	2.75	2	2	2	1	1	2	97	98	1	8	0.74	1	2	2	2
863	2900	2	69	1	2	3.25	2	2	2	1	1	2	95	97	2	4.4	2.5	1	2	2	2
864	2913	1	69	1	2	3.3	2	2	2	1	1	2	97	99	2	4.6	3.6	1	2	2	2
865	2936	1	63	1	2	2.8	2	2	2	1	1	2	100	98	2	2.1	1.9	1	2	2	2
866	2937	2	59	1	2	2.25	2	2	2	1	1	2	98	99	1	1.8	1.1	1	2	2	2
867	2901	2	60	1	2	3.25	2	2	2	1	1	2	96	98	2	1.5	3.3	1	2	2	2
868	2944	2	47	1	2	2.15	2	2	2	1	1	2	97	99	2	5.8	2.1	1	2	2	2
869	2745	1	53	1	2	3.85	2	2	2	1	1	2	95	95	0	1.6	3.2	2	2	2	2
870	2861	1	54	1	2	3	2	2	2	1	1	2	95	95	0	4.7	3.9	1	2	2	2
871	2984	2	53	1	2	3.15	2	2	2	1	1	2	98	100	2	1.4	1.2	1	2	2	2
872	2975	1	52	1	2	3.25	2	2	2	1	1	2	96	98	2	3.9	4.2	1	2	2	2
873	2862	2	52	1	2	3	2	2	2	1	1	2	99	99	0	2.1	1.6	1	2	2	2
874	2948	1	48	1	2	2.4	2	2	2	1	1	2	100	100	0	1.4	0.91	1	2	2	2
875	3021	1	44	1	1	3.5	2	2	2	1	1	2	99	98	1	2.1	1.5	1	2	2	2
876	3004	2	44	1	4	3.25	2	2	2	1	1	2	99	98	1	2.4	2.4	1	2	2	2
877	3023	2	39	1	1	2.8	2	2	2	1	1	2	97	99	2	1.2	1.7	1	2	2	2
878	3036	2	37	1	4	3.25	2	2	2	1	1	2	100	100	0	4.7	3.5	1	2	2	2
879	3041	2	36	1	1	3.2	2	2	2	1	1	2	97	97	0	8.8	1.8	1	2	2	2
880	2934	2	34	1	1	2.5	2	2	2	1	1	2	100	98	2	1.8	4.3	2	2	2	2
881	3025	2	36	1	4	3	2	2	2	1	1	2	96	99	3	2.7	3.1	1	2	2	2
882	2988	1	28	1	1	3	2	2	2	1	1	2	97	98	1	7.3	2.6	1	2	2	2
883	2986	1	26	1	1	2.75	2	2	2	1	1	2	97	98	1	7.3	5.2	1	2	2	2
884	3040	2	24	1	1	2.5	2	2	2	1	1	2	96	99	3	2.4	1.7	2	2	2	2
885	2981	1	24	1	5	3	2	2	2	1	1	2	98	99	1	1.1	2.5	1	2	2	2
886	3005	2	44	1	2	2.75	2	2	2	1	1	2	98	99	1	2	1.6	1	2	2	2
887	2850	1	35	1	2	3.6	2	2	2	1	1	2	95	96	1	1.1	1.8	1	2	2	2
888	2989	1	34	1	2	2.3	2	2	2	1	1	2	95	98	3	2.3	2.4	1	2	2	2
889	2630	2	34	1	2	3.3	2	2	2	1	1	2	98	99	1	1.4	0.96	1	2	2	2
890	3052	2	27	1	2	2.65	2	2	2	1	1	2	99	97	2	1.3	1	1	2	2	2
891	3081	1	25	1	2	3.25	2	2	2	1	1	2	98	97	1	4.2	2.2	1	2	2	2
892	2864	1	24	1	2	2.75	2	2	2	1	1	2	99	97	2	2.1	1.5	1	2	2	2
893	2791	1	24	1	2	3.2	2	2	2	1	1	2	96	95	1	1.2	0.73	1	2	2	2
894	3085	1	24	1	2	3.4	2	2	2	1	1	2	96	95	1	4.3	3.1	1	2	2	2
895	3110	2	24	1	2	2.5	2	2	2	1	1	2	99	98	1	0.97	4	1	2	2	2
896	3060	2	24	1	2	3.5	2	2	2	1	1	2	98	96	2	0.98	1.1	1	2	2	2

897	2261	2	24	1	2	2.75	2	2	2	1	1	2	98	99	1	1	3	1	2	2	2
898	3080	2	44	1	1	2.6	2	2	2	1	1	2	99	98	1	1	1.. 7	1	2	2	2
899	3088	1	41	1	1	2.75	2	2	2	1	1	2	97	99	2	5	4.3	2	2	2	2
900	3130	1	36	1	1	3.4	2	2	2	1	1	1	96	97	1	3	1.9	1	2	1	2
901	3137	2	35	1	1	2.3	2	2	2	1	1	2	99	99	0	1.1	2.6	1	2	2	2
902	2808	1	31	1	1	2	2	2	2	1	1	2	96	98	2	2.5	2.6	1	2	2	2
903	3096	2	29	1	1	2	2	2	2	1	1	2	96	99	3	4.2	4.3	1	2	2	2
904	3103	1	28	1	1	2.5	2	2	2	1	1	2	98	99	1	0.7 9	0.9 7	1	2	2	2
905	2470	2	28	1	1	2.5	2	2	2	1	1	2	100	99	1	3.6	2.3	1	2	2	2
906	3156	2	26	1	1	2.75	2	2	2	1	1	2	96	95	1	4.8	6.2	1	2	2	2
907	3150	2	26	1	1	2.25	2	2	2	1	1	2	96	98	2	2.1	2.6	1	2	2	2
908	3132	1	25	1	1	2.5	2	2	2	1	1	2	100	99	1	1.9	0.9 2	1	2	2	2
909	3135	2	26	1	1	2.25	2	2	2	1	1	2	98	98	0	3.9	4.2	1	2	2	2
910	3048	2	43	1	2	3.6	2	2	2	1	1	2	96	97	1	1.8	1.4	1	2	2	2
911	3097	2	72	1	2	2.7	2	2	2	1	1	2	95	98	3	1.4	1.1	1	2	2	2
912	3118	2	36	1	2	2.9	2	2	2	1	1	2	96	98	2	2.2	3.9	1	2	2	2
913	3136	1	32	1	2	3.1	2	2	2	1	1	2	97	96	1	1.8	1.2	1	2	2	2
914	3116	2	33	1	2	3.5	2	2	2	1	1	2	96	96	0	4.2	3.3	1	2	2	2
915	3146	2	32	1	2	2.75	2	2	2	1	1	2	97	96	1	3.5	2.3	2	2	2	2
916	3177	1	24	1	2	3.1	2	2	2	1	1	2	99	97	2	2.5	0.9 6	1	2	2	2
917	3184	1	41	1	1	3.25	2	2	2	1	1	2	95	96	1	2	4.4	1	2	2	2
918	3188	1	36	1	1	2.5	2	2	2	1	1	2	99	98	1	5.3	3.6	1	2	2	2
919	3151	2	33	1	1	2.25	2	2	2	1	1	2	100	98	2	1	1.6	1	2	2	2
920	3227	2	29	1	1	2.55	2	2	2	1	1	2	98	99	1	1.4	1.3	1	2	2	2
921	3212	2	24	1	1	3	2	2	2	1	1	2	98	100	2	25	0.7 1	1	2	2	2
922	3275	2	24	1	1	2.5	2	2	2	1	1	2	99	99	0	3.4	1.3	1	2	2	2
923	3235	2	24	1	1	2.25	2	2	2	1	1	2	96	97	1	4.1	2.4	2	2	2	2
924	3253	1	24	1	1	2.3	2	2	2	1	1	2	97	98	1	2.5	1.6	1	2	2	2
925	3277	1	24	1	1	2.6	2	2	2	1	1	2	99	100	1	2.5	2.8	1	2	2	2
926	3274	1	24	1	1	2.6	2	2	2	1	1	2	99	96	3	2.6	2.7	1	2	2	2
927	2990	2	32	1	1	3	2	2	2	1	1	2	98	98	0	4.1	1.1	1	2	2	2
928	2781	2	24	1	1	2.6	2	2	2	1	1	2	98	98	0	2.5	6.1	1	2	2	2
929	3087	2	43	1	2	2.25	2	2	2	1	1	2	96	99	3	8.3	2.9	1	2	2	2
930	3189	1	39	1	2	2.1	2	2	2	1	1	2	95	97	2	4.4	1.2	1	2	2	2
931	3191	1	39	1	2	2.5	2	2	2	1	1	2	97	99	2	3	3.8	2	2	2	2
932	3192	1	39	1	2	3.25	2	2	2	1	1	2	98	99	1	2.3	1.1	1	2	2	2
933	3062	2	39	1	2	2.7	2	2	2	1	1	2	98	98	0	1.4	4.2	1	2	2	2
934	3193	1	38	1	2	2.75	2	2	2	1	1	2	96	99	3	1.2	1.6	1	2	2	2
935	2848	2	34	1	2	3	2	2	2	1	1	2	99	99	0	1.9	1.4	1	2	2	2
936	2702	2	35	1	2	2.8	2	2	2	1	1	2	100	99	1	1.2	2	1	2	2	2
937	2708	2	33	1	2	2.5	2	2	2	1	1	2	98	100	2	5.4	1.8	1	2	2	2

938	3199	1	33	1	2	3.25	2	2	2	1	1	2	95	96	1	2.1	3	1	2	2	2
939	3270	2	29	1	2	2.75	2	2	2	1	1	2	97	95	2	3.2	2.9	1	2	2	2
940	3260	2	28	1	2	3.15	2	2	2	1	1	2	98	98	0	4.5	2.2	1	2	2	2
941	3249	2	29	1	2	3.15	2	2	2	1	1	2	97	100	3	3.4	1.6	1	2	2	2
942	3261	2	27	1	2	2.7	2	2	2	1	1	2	99	98	1	3	1.5	1	2	2	2
943	3273	1	41	1	1	2.8	2	2	2	1	1	2	99	99	0	1.4	0.9	1	2	2	2
944	3309	2	26	1	1	3.25	2	2	2	1	1	2	100	100	0	1.4	0.8	1	2	2	2
945	3308	2	24	1	1	3.5	2	2	2	1	1	2	96	98	2	1.9	0.85	2	2	2	2
946	3381	2	24	1	1	1.75	2	2	2	1	1	2	99	100	1	1	0.91	1	2	2	2
947	3264	2	42	1	2	2.7	2	2	2	1	1	2	97	99	2	3.5	3.6	1	2	2	2
948	3272	1	42	1	2	2.8	2	2	2	1	1	2	97	100	3	0.91	1.6	1	2	2	2
949	3069	1	40	1	2	2.9	2	2	2	1	1	2	95	95	0	1.6	5.2	1	2	2	2
950	3303	1	63	1	2	2.6	2	2	2	1	1	2	98	97	1	3.5	1.1	1	2	2	2
951	3165	2	39	1	2	2.5	2	2	2	1	1	2	98	98	0	0.86	1.7	1	2	2	2
952	3278	2	39	1	2	3.1	2	2	2	1	1	2	97	99	2	11	5.7	1	2	2	2
953	2805	2	32	1	2	3.33	2	2	2	1	1	2	96	99	3	2.2	2.1	1	2	2	2
954	3292	2	31	1	2	2.5	2	2	2	1	1	2	98	100	2	1.8	0.77	1	2	2	2
955	3306	2	31	1	2	2.75	2	2	2	1	1	2	98	98	0	7.2	3.1	1	2	2	2
956	3335	1	30	1	2	2.5	2	2	2	1	1	2	98	99	1	2.3	2.3	1	2	2	2
957	3176	2	31	1	2	2.85	2	2	2	1	1	2	97	100	3	2.2	0.93	1	2	2	2
958	2914	2	30	1	2	3.2	2	2	2	1	1	2	98	99	1	3.3	2.6	1	2	2	2
959	3205	2	27	1	2	3	2	2	2	1	1	2	99	100	1	1.3	3.6	1	2	2	2
960	3370	2	26	1	2	2.25	2	2	2	1	1	2	97	99	2	1.1	1.8	1	2	2	2
961	3300	2	27	1	2	2.75	2	2	2	1	1	2	100	99	1	6.7	2.4	2	2	2	2
962	3360	1	24	1	2	2.75	2	2	2	1	1	2	95	97	2	1.1	1.9	1	2	2	2
963	3354	1	24	1	2	2.25	2	2	2	1	1	2	97	98	1	1.1	1.8	1	2	2	2
964	3375	2	24	1	2	2.4	2	2	2	1	1	2	99	100	1	3.1	11	1	2	2	2
965	2408	2	40	1	4	2.6	2	2	2	1	1	2	96	99	3	4.1	2.3	1	2	2	2
966	3391	1	38	1	1	3.5	2	2	2	1	1	2	98	98	0	2.1	1	1	2	2	2
967	3351	1	36	1	1	3.25	2	2	2	1	1	2	99	98	1	6.2	5.8	1	2	2	2
968	3444	2	25	1	1	3.1	2	2	2	1	1	2	98	99	1	2.1	2	1	2	2	2
969	3296	2	41	1	2	2.5	2	2	2	1	1	2	100	100	0	2.8	3.5	1	2	2	2
970	3382	1	41	1	2	2.25	2	2	2	1	1	2	96	99	3	3.4	1.7	1	2	2	2
971	3389	1	39	1	2	2.5	2	2	2	1	1	2	98	97	1	1.1	2.1	1	2	2	2
972	3396	1	36	1	2	2.75	2	2	2	1	1	2	95	97	2	1.7	3.4	1	2	2	2
973	3255	1	31	1	2	2.7	2	2	2	1	1	2	96	98	2	2.8	1.5	1	2	2	2
974	3397	1	31	1	2	3.25	2	2	2	1	1	2	98	99	1	0.86	1.8	1	2	2	2
975	3428	2	26	1	2	3.7	2	2	2	1	1	2	96	98	2	3	3.7	1	2	2	2
976	3357	1	25	1	2	3.2	2	2	2	1	1	2	97	100	3	4.2	2.4	1	2	2	2
977	3290	2	24	1	2	3.8	2	2	2	1	1	2	99	99	0	1	1.8	1	2	2	2
978	3404	1	24	1	2	2.8	2	2	2	1	1	2	98	99	1	1	2.8	1	2	2	2

979	3352	2	24	1	2	3.1	2	2	2	1	1	2	98	98	0	2	3	1	2	2	2
980	3480	2	36	1	1	2.1	2	2	2	1	1	2	98	99	1	3.8	4.8	1	2	2	2
981	3491	2	35	2	1	2.25	2	2	2	1	1	2	96	96	0	1.1	1	1	2	2	2
982	3434	1	34	1	1	3.25	2	2	2	1	1	2	96	98	2	2	2.2	1	2	2	2
983	3485	1	34	1	1	2.75	2	2	2	1	1	2	96	96	0	1.3	1.8	1	2	2	2
984	3501	2	32	1	1	3.3	2	2	2	1	1	2	99	100	1	0.9	1.6	2	2	2	2
985	3489	2	25	1	1	2.2	2	2	2	1	1	2	99	99	0	3.2	1.6	1	2	2	2
986	3524	2	24	1	1	1.8	2	2	2	1	1	2	97	98	1	2.9	6.2	1	2	2	2
987	3343	1	24	1	1	3.15	2	2	2	1	1	2	97	100	3	1.2	2.6	1	2	2	2
988	1938	1	31	1	2	2.6	2	2	2	1	1	2	99	100	1	2.1	3	1	2	2	2
989	3131	1	31	1	2	3.6	2	2	2	1	1	2	96	98	2	2.1	3.3	1	2	2	2
990	3496	2	30	1	2	2.75	2	2	2	1	1	2	97	98	1	2.8	2.1	1	2	2	2
991	3487	2	28	1	2	3.1	2	2	2	1	1	2	96	98	2	2.1	2.9	1	2	2	2
992	3472	1	31	1	2	3.2	2	2	2	1	1	2	95	95	0	1.6	3	1	2	2	2
993	3474	2	26	1	2	2.4	2	2	2	1	1	2	100	100	0	1.1	3.5	1	2	2	2
994	3353	2	25	1	2	2.75	2	2	2	1	1	2	96	98	2	2	1.5	1	2	2	2
995	3537	1	24	1	2	2.5	2	2	2	1	1	2	97	96	1	1.6	1.8	1	2	2	2
996	3508	1	24	1	2	2.65	2	2	2	1	1	2	100	99	1	2.2	2.5	1	2	2	2
997	3514	2	24	1	2	2.5	2	2	2	1	1	2	98	100	2	0.96	1.3	1	2	2	2
998	3473	1	43	1	1	2.5	2	2	2	1	1	2	98	99	1	1.2	2	2	2	2	2
999	3563	1	43	1	1	2.6	2	2	2	1	1	2	97	96	1	2.1	2	1	2	2	2
1000	3371	2	38	1	1	2.25	2	2	2	1	1	2	99	98	1	1.3	0.9	1	2	2	2
1001	3562	1	37	1	4	2.8	2	2	2	1	1	2	98	96	2	1.5	1.3	1	2	2	2
1002	3559	2	37	1	5	2.6	2	2	2	1	1	2	96	99	3	4.5	3.8	1	2	2	2
1003	3547	1	34	1	1	3.6	2	2	2	1	1	2	95	97	2	2	1.5	1	2	2	2
1004	3641	2	32	1	1	2.5	2	2	2	1	1	2	96	98	2	1.3	2.2	1	2	2	2
1005	3561	1	43	1	2	2.75	2	2	2	1	1	2	97	96	1	0.9	0.8	1	2	2	2
1006	3074	2	43	1	2	2.75	2	2	2	1	1	2	95	96	1	1.2	1.5	2	2	2	2
1007	3590	1	31	1	2	2.5	2	2	2	1	1	2	99	98	1	3.4	2.7	1	2	2	2
1008	3581	2	32	1	2	2.2	2	2	2	1	1	2	97	95	2	2	3.4	1	2	2	2
1009	3589	1	31	1	2	3.3	2	2	2	1	1	2	99	96	3	1.1	2.3	1	2	2	2
1010	3511	2	26	1	2	2.75	2	2	2	1	1	2	100	98	2	3.1	2.9	1	2	2	2
1011	3608	1	24	1	2	3.6	2	2	2	1	1	2	98	98	0	1.5	1.7	1	2	2	2